EXHIBIT 18

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF PUERTO RICO

In re: THE FINANCIAL OVERSIGHT AND MANAGEMENT BOARD FOR PUERTO RICO, as representative of THE COMMONWEALTH OF PUERTO RICO, et al. Debtors.	PROMESA TITLE III Case No. 17-BK-3283-LTS (Jointly Administered)
In re: THE FINANCIAL OVERSIGHT AND MANAGEMENT BOARD FOR PUERTO RICO, as representative of THE PUERTO RICO ELECTRIC POWER AUTHORITY, Debtor.	Case No. 17-BK-4780-LTS **This Court Filing Relates Only to PREPA and Shall be Filed Only in Case No. 17-BK-4780-LTS and Main Docket 17-BK-3283-LTS**

EXPERT REPORT OF MAUREEN M. CHAKRABORTY, PHD

APRIL 28, 2023

TABLE OF CONTENTS

I. INTRODUCTION

A. Summary of Dispute and Assignment

1. The Modified Second Amended Title III Plan of Adjustment of the Puerto Rico Electric Power Authority (ECF No. 3296) and its corresponding Disclosure Statement (ECF No. 3279) propose to restructure PREPA's liabilities principally through an issuance of $5.68 billion of New Bonds to fund partial recoveries on creditors' claims.[1] In addition to $8.26 billion in outstanding PREPA revenue bonds, plus approximately $218 million in prepetition accrued interest on such bonds,[2] PREPA estimates $700.9 million in Fuel Line Loan Claims and projects between approximately $246 million and $4.9 billion (with an estimate of $800 million) in General Unsecured Claims.[3]

2. Under the proposed Plan of Adjustment, PREPA's future payments of principal and interest on the New Bonds would be funded, over an expected 35-year period, by generating Net Revenues ("Additional Net Revenues") through imposition of a charge to PREPA's customers (called the "Legacy Charge"). That proposed Legacy Charge comprises (i) an additional monthly flat fee for customers' connection to PREPA's power grid and (ii) additional charges based on

---

1 Disclosure Statement for Modified Second Amended Title III Plan of Adjustment of the Puerto Rico Electric Power Authority, *In re: The Financial Oversight and Management Board for Puerto Rico, as a representative of the Commonwealth of Puerto Rico, et al., Debtors*, PROMESA Title III No. 17-BK-3283-LTS, and *In re: The Financial Oversight and Management Board for Puerto Rico, as a representative of Puerto Rico Electric Power Authority, Debtor*, PROMESA Title III No. 17-BK-4780-LTS (Jointly Administered), United States District Court for the District of Puerto Rico, San Juan, Puerto Rico, March 1, 2023 (the "Disclosure Statement"), p. 36; Disclosure Statement Exhibit A: Modified Second Amended Title III Plan of Adjustment of the Puerto Rico Electric Power Authority ("Plan" or "Plan of Adjustment"), p. 42.

2 Disclosure Statement Exhibit H: Summary of Outstanding PREPA Bonds ("Summary of Outstanding PREPA Bonds"), p. 2.

3 Disclosure Statement Exhibit H: Summary of Outstanding PREPA Bonds ("Summary of Outstanding PREPA Bonds"), p. 2; Disclosure Statement, p. 28; Disclosure Statement Exhibit O: Estimation of General Unsecured Claims Pool ("Estimation of General Unsecured Claims Pool").

electricity consumption on a per-kilowatt-hour (kWh) basis (a "volumetric charge"). The Financial Oversight and Management Board (the "Board") determined the Legacy Charge by developing a view of what it deems affordable for PREPA's customers. Based on that analysis, which I address in my Report, the Board says that an affordable and sustainable Legacy Charge will generate only $5.68 billion in Additional Net Revenues, measured as of the effective date of the Plan of Adjustment.[4] In other words, the Board considers that the maximum amount of New Bonds that PREPA can afford to service (and thus make available to satisfy more than $10 billion in total liabilities under the Plan) is $5.68 billion.

3. I have been asked by counsel for the Ad Hoc Group of PREPA Bondholders, Assured Guaranty Corp., Assured Guaranty Municipal Corp., and Syncora Guarantee Inc. (the "Bondholders") to evaluate the Board's proposed Legacy Charge. I have also been asked to perform an independent assessment and calculation of the reasonable range of Additional Net Revenues that PREPA is capable of collecting from customers to repay its creditors. In doing my own assessment, I subjected my calculations to the same considerations identified by the Board, including that PREPA's rates must at all times be affordable to its customers, enable PREPA's long-term sustainability, and account for the impact that an additional increase in the price of electricity could have on the demand for electricity (an economic concept referred to as the

[4] Note that the Plan of Adjustment contains many values that are expressed as the net present value of a series of cashflows. In this report when I refer to values for terms such as "Revenue Envelope," "Revenues Remaining," and "Additional Net Revenues," I am referring to the net present value of the series of cashflows associated with these terms unless I explicitly note otherwise. For ease of comparison with the Board's presentation, I adopt the same discount rate that the Board uses in arriving at their net present value estimates, which is six percent. My use of six percent does not constitute agreement on my part that this is the correct discount rate to use for these cashflows. See Plan of Adjustment, p. 29.

“elasticity of demand”[5]), taking into account consumer behavior and the availability of alternative energy sources (such as solar power).[6]

B. Qualifications

4. I am a Managing Principal at Analysis Group, Inc. (“Analysis Group”), and I earned my Ph.D. in Economics from the University of Notre Dame and my B.A. in Economics from Colby College. Analysis Group provides economic, financial, and business strategy consulting to its clients. It specializes in the interpretation of economic and financial data and the development of economic and financial models. I have an extensive background in economics, finance, accounting, and valuation. I have served both as an expert witness and as a consultant in matters involving valuation, solvency, fraudulent conveyance, creditor recovery, reinstatement of debt, successor liability, securities matters, and economic damages.

5. My *curriculum vitae*, which includes a list of all publications I have authored, is attached as **Appendix A** to this report, and a list of cases in which I have provided expert testimony in the last four years is attached as **Appendix B**.

C. Compensation

6. Analysis Group bills on an hourly basis for my work in connection with this assignment. My billing rate for time spent on this matter is $1,055 per hour. Employees of Analysis Group, working under my direction and supervision, have assisted me in this assignment at their

---

5 Elasticity of demand is a measure of the responsiveness of quantity demand to changes in price. Hubbard, R. Glenn, and O’Brien, Anthony Patrick, “Microeconomics, Seventh Edition,” (New York, NY: Pearson, 2019), p. 184. I describe this economic concept and its impact on PREPA’s ability to collect Additional Net Revenues in subsequent sections of this report.

6 Disclosure Statement Exhibit P: Legacy Charge Derivation (“Legacy Charge Derivation”), p. 2.

standard hourly rates. Neither my compensation nor Analysis Group's is contingent upon the opinions I form or the outcome of this case.

D. Information Considered

7. In preparation of this expert report, I, along with Analysis Group staff working under my direction, have reviewed various documents and data sources. I attach a list of documents and sources which I have considered as **Appendix C** to this Report.

E. Structure of This Report

8. This Report is organized as follows:

a. **Part 1** consists of two sections: an introduction (**Section I**) and a summary of my opinions (**Section II**).

b. **Part 2** is one section, **Section III**, which describes the Board's methodology for calculating the funds it expects PREPA to have available to repay creditors and the Board's methodology for determining the Legacy Charge to collect those funds.

c. **Part 3** consists of three sections that set out flaws I have identified in the Board's analyses. **Section IV** explains several problems with the Board's affordability analysis and presents my calculation of Additional Net Revenues that PREPA is able to collect after correcting the Board's affordability analysis. **Section V** presents my calculation of Additional Net Revenues using the alternative load forecasts presented in the Expert Report of Dr. Susan Tierney. **Section VI** presents my calculation of Additional Net Revenues after replacing the Board's inflated elasticity of demand assumptions with elasticity assumptions that are supported by

academic literature. Section **VII** discusses the capital expenditures assumed by the Board.

d. **Part 4** is one section, **Section VIII**, which summarizes my conclusions regarding the range of Additional Net Revenues that PREPA is capable of collecting from customers.

II. SUMMARY OF OPINIONS

9. I conclude that the Board's methodology for calculating the Additional Net Revenues that PREPA is capable of collecting from customers to repay creditors is based on a number of inaccurate and unreasonable assumptions and calculations. Correcting for demonstrable problems in the Board's calculations significantly increases the amount of Additional Net Revenues that PREPA can reasonably collect while remaining well within the Board's own view of what is affordable for PREPA's customers.

10. The Board determines Additional Net Revenues in three steps:

a. First, the Board determines what it refers to as the "Revenue Envelope," the maximum additional revenue that can be generated based upon a combination of fixed (flat fee) and volumetric (pay for what you use) rates that are affordable to PREPA customers. The Board determines these rates based on its view of how much a hypothetical residential customer, earning $24,000 annually in 2024, and using 425 kWh of electricity per month (the "Hypothetical Residential Customer"), could afford to pay for electricity.[7] Specifically, the Board's "affordability"

[7] The Board created this hypothetical customer based on the median income earning residential household in Puerto Rico, but not the median consumption of electricity.

threshold is that residential customers should not pay more than 6% of their monthly income for electricity, i.e., a 6% share of "wallet," or in the case of the Board's Hypothetical Residential Customer, no more than $120 per month ($24,000 / 12 months = $2,000/month × 6% = $120/month). The Board calculates the maximum additional fixed and volumetric rates (incremental to the rates provided in PREPA's Certified 2022 Fiscal Plan) that PREPA could charge this Hypothetical Residential Customer and remain below the 6% affordability threshold. These additional rates form the basis for determining the maximum additional fixed and volumetric rates the Board deems affordable for *all* PREPA's residential, industrial, commercial, government, and municipal customers. The Board applies the additional rates it determines for all customer classes to its forecast of the demand for electricity through 2051 to estimate the Revenue Envelope, which it concludes is $6.38 billion. The Board represents that this is the maximum amount of additional revenues that PREPA is able to collect from its customers through 2051.

b. Second, the Board calculates an amount it refers to as "Revenues Remaining" by subtracting two amounts from the Revenue Envelope: (i) an additional amount the Board now says is necessary to fund future capital expenses—over and above what was forecast in PREPA's Certified 2022 Fiscal Plan; and (ii) an amount it claims will be necessary to pay a portion of PREPA's fixed costs because the Board contends that the additional volumetric rates will result in lower electricity consumption (and a shortfall in revenues available to pay PREPA's total fixed costs). After deducting these two claimed future expenses from the Revenue

Envelope, the Board calculates Revenues Remaining of $4.68 billion for the years 2024–2051, which is the maximum amount the Board claims will be available to repay creditors. (As discussed next, the Board extends the period over which they would collect Additional Net Revenues from 2024–2051 to 2024–2058, which increases this amount to $$5.68 billion.)

c. Third, the Board determines a combination of incremental fixed and volumetric rates that, based on the Board's projections, over the years 2024–2051, will generate PREPA revenues that will generally equal the Board's estimate of $4.68 billion of Revenues Remaining. The Board labels this combination of rates the "Legacy Charge." The Board then extends the Legacy Charge to 2058 and calculates a net present value of $5.68 billion in Additional Net Revenues, which are the total additional revenues the Board claims PREPA can collect via a Legacy Charge and make available to service the New Bonds issued under the Plan.

11. I reviewed the Legacy Charge and the Board's view of the Additional Net Revenues PREPA could collect. Based on my review of these calculations, I conclude that the Board makes several inaccurate and unreasonable assumptions and calculations that have the effect of reducing Additional Net Revenues. In other words, even accepting the Board's 6% share of wallet solely for purposes of this Report,[8] I conclude that the Board understates the amount of revenues PREPA can generate to repay creditors.

[8] The Board's share of wallet analysis is based on the assumption that customers should not spend more than 6% of their income on electricity expenses. This threshold comes from a study that found that households should not spend more than 30% of their income on total shelter costs, and assuming that a household spends 30% of its income on shelter costs, it should not spend more than 20% of its total shelter spending on electricity (i.e., 20% of 30% equals 6%). The study on which the Board is relying for this metric was conducted for households areas such as New York, where shelter costs are significantly higher than in Puerto Rico. The significantly lower shelter

12. **The Board Overstates Electricity Consumption for its Hypothetical Residential Customer and Thereby Creates an Artificially Low Ceiling on the Legacy Charge**: The Board assumes the Hypothetical Residential Customer consumes 425 kWh of electricity monthly. But that level of consumption is unsupported by data from LUMA and the Puerto Rico Community Survey. The Board selected a household earning $24,000 in 2024 for its Hypothetical Residential Customer because it approximates the median household income in 2024, the initial year of the Legacy Charge. Data provided by LUMA and the Puerto Rico Community Survey demonstrate that a household earning $24,000 in Puerto Rico does not actually consume 425 kWh of electricity monthly, but will instead consume 372 to 400 kWh monthly. By projecting a higher level of electricity consumption per month than consumers at the median income level actually use, the Board overstates their current spending for electricity and thereby creates too low a ceiling on the Legacy Charge rates that would keep the monthly electricity bill of the Hypothetical Residential Consumer below $120. This error has large implications for the calculation of Additional Net Revenues that PREPA could reasonably collect from customers to repay creditors. Correcting the consumption level of the Board's Hypothetical Residential Customer to reflect the actual expected consumption of a household earning $24,000 results in Additional Net Revenues between $7.19 billion and $8.96 billion, an increase of $1.51 billion to $3.28 billion over the amount calculated by the Board. See **Section IV.A**. These corrections to reflect actual consumption levels are implemented keeping the Hypothetical Residential

costs in Puerto Rico (households spend significantly less than 30% of income on shelter costs) implies an ability to spend somewhat more than 6% of income on electricity while still allowing Puerto Rico residents to remain well below 30% spending on total shelter costs. Moreover, the informal economy in Puerto Rico is far larger relative to the size of the local economy than in the mainland United States, implying that true income levels materially exceed reported income levels. Accordingly, for both of these reasons, share of wallet calculations that are based on reported income in Puerto Rico may overstate the actual share of wallet spent on electricity. That is, Puerto Rico residents likely are able to spend *more* than 6% of their reported income on electricity.

Customer's monthly electricity bill at $120, which the Board deems is affordable for a household earning $2,000 per month (or $24,000 annually).

13. **The Board Incorrectly Fails To Incorporate the Effects of Inflation Over a Multi-Decade Period**: Despite purporting to calculate rates that are affordable over a period extending 35 to 50 years into the future, the Board actually conducts its affordability analysis only for the first year of the Legacy Charge (2024) and then holds the estimated Legacy Charge's fixed and volumetric rates constant for the duration of the period. In other words, the Board assumes that the amount of money the Hypothetical Residential Customer can spend on electricity per month in 2024 will continue to be the same amount ($120) for three and a half decades—even though the Board itself forecasts an inflation rate of 1.7% over that same period. This assumption effectively reduces the "real" cost of the charge in each year. This is not economically sensible. There is no basis to keep the Legacy Charge constant over a 35 to 50 year period without making any adjustment for changes in purchasing power. For example, $1 in 1972 was equivalent in purchasing power to $7.09 in 2022. The Board nevertheless is assuming that its Hypothetical Residential Customer's nominal annual income remains constant—and that its real income (which is adjusted for inflation) decreases—*every year* between 2024–2058. In reality, nominal median household income in Puerto Rico has been growing and was approximately $14,412 in 1999, $18,314 in 2009, and $20,269 in 2018. I show that if the Board were to conduct its affordability calculation each year through 2058 and properly take into account reasonable assumptions of wage growth just driven by inflation alone, then, Additional Net Revenues would be $6.59 billion, an increase of $910 million over the amount calculated by the Board. See **Section IV.B**.

14. **The Board's Method of Adjusting the Maximum Rates Deemed Affordable for the Hypothetical Residential Consumer to Determine the Maximum Rates for Higher**

<u>Income Residential Households, Commercial, Industrial, Municipal, and Government Customers is Not a Reliable Measure of Affordability</u>: The Board's method of adjusting the maximum affordable rates it calculates for its Hypothetical Residential Customer to determine the maximum affordable rates for all other customers is unsupported and does not provide a reliable measure of affordability for these other customers. First, the Board assumes that the maximum affordable rates determined for its Hypothetical Residential Customer are the maximum affordable rates for all residential non-exempt customers, including customers with household incomes well above $24,000 per year. Approximately 46% of PREPA customers are residential customers with income higher than the Hypothetical Residential Customer and who therefore can afford to pay more for electricity, even under the Board's share of wallet threshold. And the bulk of low-income residential customers would be exempt from paying some or all of the Legacy Charge. Accordingly, the Legacy Charge proposed by the Board leads to a wallet share below 6% for most residential customers who would actually pay it. However, the Board does not directly assess the affordable rate for households earning above $24,000.

15. I correct the Board's failure to address the fact that higher earning residential customers can afford to pay more than the Hypothetical Residential Customer by making modest changes to the relative proportion of the Board's estimate of the Revenue Envelope that is collected from additional fixed versus volumetric rates. Specifically, additional revenues collected from the Board's proposed maximum fixed rate represents about 87% of the total Revenue Envelope. I reduced the fixed charge proportion of the maximum affordable rate from 87% for the Hypothetical Residential Customer (the Board's rate structure) to 80%, and 75%, which maintains the Board's affordability threshold for the Hypothetical Residential Consumer, and demonstrate that this change increases Incremental Net Revenues by $70 million to $122 million.

16. Second, the Board purports to determine the maximum affordable additional volumetric rates for non-residential customer classes by identifying "adjustment factors" for each non-residential customer class and applying those adjustment factors to the maximum affordable additional volumetric rate that the Board determined for the Hypothetical Residential Customer. The application of an elasticity adjustment lacks any logical connection to considerations of affordability for those customer classes. It is also not consistent with the Board's 6% share of wallet affordability framework. To calculate the additional fixed rate for non-residential customer classes, the Board calculates the percentage difference between the hypothetical residential customer's additional fixed rate and the base fixed rate (under the 2022 PREPA Fiscal Plan) and assumes that the fixed rates for the non-residential customer classes should be adjusted using the same percentage difference. The Board thus assumes that the base fixed rates for each non-residential class were as close to their corresponding maximum affordable fixed rates as the rates for the Hypothetical Residential Customer. The Board does not provide a basis for this assumption.

17. These ad hoc assumptions, applied to determine the fixed and volumetric rates for non-residential customer classes for purposes of determining the size of the Revenue Envelope, do not constitute a plausible affordability analysis for those customers. This is particularly important given the large share of PREPA revenues that non-residential customers contribute to PREPA's total revenues. While only approximately 8.3% of PREPA's customers are industrial and commercial customers, their aggregate consumption is high and they contribute 56.3% to PREPA's total revenues.[9] For these customer classes, I assess affordability by reference to the size of electricity costs relative to total operating costs. I show that, based on electricity share of total operating costs, these customer classes can afford to pay a higher Legacy Charge than presented

[9] Revenue Envelope and Legacy Charge Derivation Workbook.

by the Board. Specifically, I show that increasing the maximum volumetric rates for all industrial and commercial electricity by just one cent per kWh increases Additional Net Revenues by approximately $470 million and increasing the Board's maximum volumetric rates by just 2.5 cents per kWh increases Additional Net Revenues by approximately $1.068 billion. With these changes, the share of operating costs represented by electricity remains low for industrial customers in Puerto Rico. See **Section IV.D**.

18. **More Realistic Electricity Demand Forecasts Increase the Additional Net Revenues**: In its Revenue Envelope calculation, the Board combines the additional fixed and volumetric rates it determines for each customer class with a forecast of PREPA electricity demand for each customer class. In her report (the "Tierney Report"), Dr. Susan Tierney discusses the flaws in the Board's adjusted electricity demand forecasts and presents three revised net load forecasts that she concludes are more realistic. One revised net load forecast corrects the Board's forecast using what Dr. Tierney describes as more reasonable assumptions related to the adoption of energy efficiency measures, distributed generation (principally, rooftop solar panels), and electric vehicles by PREPA customers over the forecast period. The other two build on the first revised net load forecast and further adjust the forecasted load for two different projections of future GNP growth underlying the Base Case PREPA load forecasts.

19. I conduct three calculations of Additional Net Revenues based on each of the three revised net load forecasts contained in the Tierney Report. I find that Additional Net Revenues are $5.75 billion, 5.93 billion, and $6.24 billion, respectively, corresponding to increases of $70 million, $250 million, and $560 million over the amount calculated by the Board. See **Section V**.

20. **The Board Understates Additional Net Revenues by Applying Electricity Elasticity Assumptions That Are Not Supported by the Relevant Literature**: The Board uses

estimates of the elasticity of demand for electricity to adjust its net load forecast to account for a decrease in electricity consumption as rates are increased. Higher elasticities generally correspond with larger changes in electricity consumption and, in this case, a smaller Revenue Envelope and amount of Additional Net Revenues. The Board concludes that higher rates and corresponding lower consumption will reduce the revenues that PREPA will collect, creating a "shortfall" in revenues available to cover fixed costs (the "Elasticity Effect" or "Fixed Cost Under-Recovery"). Therefore, the Board reduces the Revenue Envelope by an amount it claims will be necessary to cover that shortfall. In her expert report, Dr. Tierney finds that the elasticity estimates used by the Board are higher than elasticity estimates from the academic literature. Using lower elasticity rates from the academic literature discussed in Dr. Tierney's report, I show that Additional Net Revenues increase to $5.97 billion to $6.26 billion, an increase of $290 million to $580 million over the amount calculated by the Board. See **Section VI**.

21. **The Board Understates Additional Net Revenues by Adopting Unsupported Assumptions for Required Capital Expenditures**: The Board also subtracts from the Revenue Envelope a sum that the Board now says reflects future capital expenses. These capital expenses are over and above the capital expenses included in the PREPA forecasts the Board has certified in the 2022 PREPA Fiscal Plan. This deduction from the Revenue Envelope reduces the Additional Net Revenues available to service the New Bonds by $887 million. In her expert report, Dr. Tierney explains that the additional capital expenses assumed by the Board are unsupported. Insofar as these additional capital expenses do not materialize, Additional Net Revenues could increase by an additional $887 million. See **Section VII**.

22. As I describe in detail in this report, PREPA can afford to pay substantially more than what is proposed to be paid under the Plan even accepting its own affordability thresholds

and other considerations. I correct for a number of inaccurate and unreasonable assumptions and calculations in the Board's estimate of the Revenue Envelope and Additional Net Revenues. The impact of each change in isolation is summarized in **Table 1**.

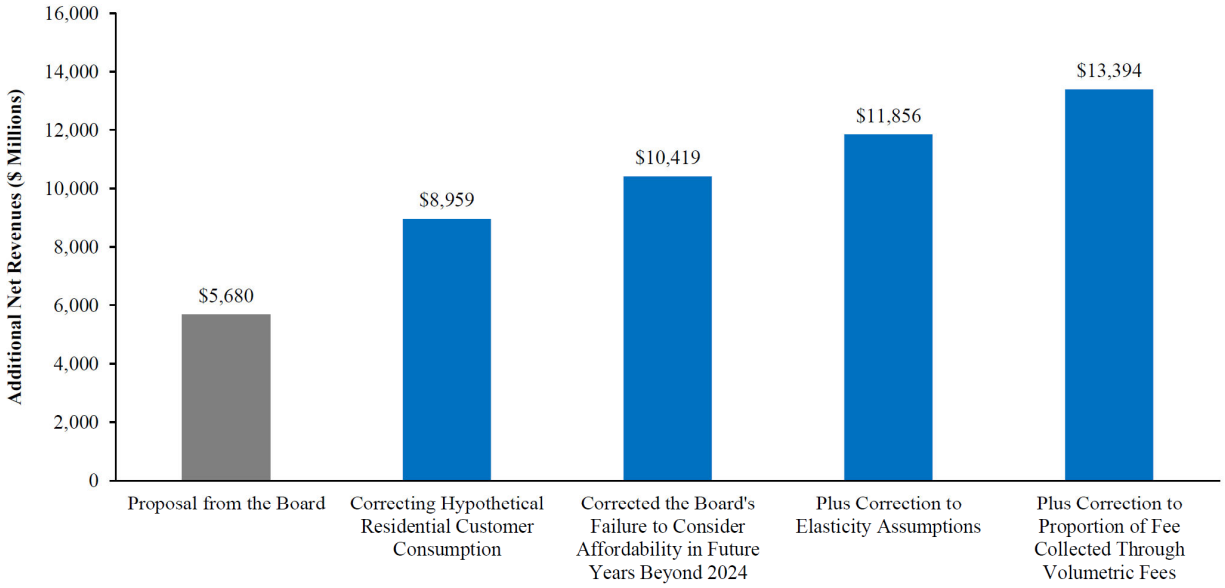
TABLE 1
"ADDITIONAL NET REVENUES" FOLLOWING CORRECTION OF ERRORS MADE BY THE BOARD

		Incremental "Additional Net Revenues" Beyond Board Proposal ($ Millions)
[A]	Corrected Hypothetical Residential Consumer Monthly Consumption	$1,508–$3,279
[B]	Corrected the Board's Failure to Consider Affordability in Future Years Beyond 2024	$892
[C]	Corrected Elasticity Estimates	$290–$581
[D]	Corrected Ability to Capture Revenue from Higher Earning Residential Customers	$70–$122
[E]	Corrected Approach for Estimating Affordable Rates for Commercial and Industrial Customers	$471–$1,068
[F]	Corrected Capital Expenditure Estimates	$887
[G]	Corrected Load Projections	$70–$564

Sources:
[1] Disclosure Statement.
[2] Revenue Envelope and Legacy Charge Derivation Workbook.
[3] Puerto Rico Community Survey.
[4] Zhu, Xing, Lanlan Li, Kaile Zhou, Xiaoling Zhang, and Shanlin Yang. "A meta-analysis on the price elasticity and income elasticity of residential electricity demand," *Journal of Cleaner Production* , no. 201 (2018): 169−77.
[5] Burke, Paul J. and Ashani Abayasekara,"The Price Elasticity of Electricity Demand in the United States: A Three-Dimensional Analysis," *The Energy Journal* 39, no. 2 (2018): 126−46.
[6] Edwards Report.
[7] Tierney Report.

23. I also consider and present various combinations of corrections to the Board's estimates that demonstrate that PREPA can collect significantly more Additional Net Revenues to repay creditors' claims. I note that the combinations of these corrections can have compound effects, such that the impact of two or more corrections can add to more than the arithmetic sum of the individual effects. For example, making only the first four of the corrections from Table 1 to the Board's calculations results in Additional Net Revenues of approximately $13.39 billion as shown in **Figure 1**.

FIGURE 1
COMPOUND IMPACT ON "ADDITIONAL NET REVENUES" FOLLOWING CORRECTION OF SELECT ERRORS MADE BY BOARD



Note: The elasticity correction uses the Zhu et al. (2018) elasticity estimates.

Sources:
[1] Disclosure Statement.
[2] Revenue Envelope and Legacy Charge Derivation Workbook.
[3] Puerto Rico Community Survey.
[4] Zhu, Xing, Lanlan Li, Kaile Zhou, Xiaoling Zhang, and Shanlin Yang. "A meta-analysis on the price elasticity and income elasticity of residential electricity demand," *Journal of Cleaner Production*, No. 201 (2018): 169-177.

III. SUMMARY OF THE BOARD'S CALCULATION OF THE LEGACY CHARGE AND FUTURE REVENUES AVAILABLE FOR DEBT SERVICE

24. The Board proposes to add a temporary Legacy Charge to generate Additional Net Revenues to fund New Bonds to be issued under the Plan.[10] The Board estimates that the proposed Legacy Charge would support PREPA's issuance of New Bonds with a par value of no more than

[10] Disclosure Statement, pp. 39 ("PREPA's current rates are insufficient to provide for the repayment of legacy or restructured debts after payment of PREPA's operating expenses. Accordingly, to provide sufficient Net Revenues to provide a source of repayment of the New Bonds to be issued by PREPA under the Plan, the Plan requires the Debtor to implement the Legacy Charge, which will be an additional charge to PREPA's current rates.").

$5.68 billion to be distributed to certain creditors (including but not limited to bondholders) under the terms of the Plan of Adjustment.[11]

25. The Board first determines what it calls PREPA's "Revenue Envelope," which it describes as the maximum additional revenues the Board believes PREPA could generate by charging "the total rate that PREPA customers can pay" and without threatening PREPA's sustainability, undermining Puerto Rico's economy, or causing undue hardship to customers.[12] The Board determines the maximum fixed and volumetric charges that are affordable and sustainable based on how much a hypothetical residential household in 2024, with $24,000 annual income and using 425 kWh of electricity per month (the "Hypothetical Residential Customer"), could pay for electricity without the customer's electricity bill exceeding $120 per month, or 6% of the customer's monthly income.[13] The Board does not conduct an affordability analysis for any residential customers other than the Hypothetical Residential Customer. The Board then uses the total affordable rate it determines for the Hypothetical Residential Customer as its basis for determining the total affordable rates for all of PREPA's residential, industrial, commercial, and governmental customers. The Board's resulting calculations of PREPA's total affordable rates, less the base rates from PREPA's 2022 Fiscal Plan, are then multiplied by a forecast of PREPA's future electricity demand (also referred to as the system's "load forecast") to arrive at the Revenue Envelope.

---

[11] Disclosure Statement, p. 5 ("Based on electricity demand projections pursuant to PREPA's 2022 certified fiscal plan (the "Certified Fiscal Plan"), the Legacy Charge is expected to generate sufficient revenue over the next thirty-five years to fully repay the approximately $5.68 billion of New Bonds being issued under the Plan..."). The Petition claim was approximately $8.3 billion plus $218 million in accrued interest. See Summary of Outstanding PREPA Bonds, p. 2.

[12] Legacy Charge Derivation, p. 4.

[13] Note that I discuss the selection of the $24,000 household income level, the level of electricity consumption associated with such a household, and the selection of the 6% affordability threshold below in **Section IV**.

26. The Board then subtracts two items from the total available funds in the Revenue Envelope. The Board subtracts an amount it contends is necessary to cover fixed costs in the event the higher rates result in lower kWh usage (and therefore lower revenues). The Board also subtracts an amount it asserts is necessary for future capital expenses over and above what PREPA had forecast and the Oversight Board certified in the 2022 PREPA Fiscal Plan. Subtracting these two items from its Revenue Envelope, the Board arrives at the "Revenues Remaining" to service New Bonds issued under the Plan.

27. The Board then derives a new, lower, set of electricity rates (which it labels the "Legacy Charge") that will generate a revenue stream that equals the Revenues Remaining on a net present value basis. The Legacy Charge has two components:

a. *Fixed Rate*: This is a monthly fee paid by all customers connected to the PREPA grid unless the customer qualifies for an exemption from the fixed rate.[14]

b. *Volumetric Rate*: This is a charge per kilowatt hour (kWh) based on each customer's consumption of electricity from the PREPA grid unless the customer qualifies for an exemption from the volumetric rate.[15]

The Board proposes that all general, non-subsidized residential customers would pay an additional $13 each month for the fixed rate component of the Legacy Charge, plus an additional volumetric

[14] Disclosure Statement, p. 40 ("First, PREPA will charge the Flat Fee to all customers each month unless the customer qualifies for an exemption from the Flat Fee. The amount paid for the Flat Fee portion of the Legacy Charge is a connection charge assessed on each non-exempt customer connected to PREPA's electricity grid.").

[15] Disclosure Statement, p. 40 ("PREPA will charge a Volumetric Charge based on each customer's consumption of electricity supplied by PREPA. The Volumetric Charge will be assessed on a cents per-kilowatt hour basis, the amount of which will vary per customer class, for electricity consumed during each billing cycle… Customers eligible for an exemption from the Flat Fee will also be exempt from paying the Volumetric Charge up to 500 kWh of monthly metered consumption. If an exempt customer's utilization exceeds that threshold, that customer will be charged fifty percent of the Volumetric Charge applicable for such customer class for consumption above the threshold on a per-kilowatt hour basis.").

rate of 0.75 cents per kWh up to 500 kWh per month and 3 cents for each kWh over 500 kWh per month. Residential customers enrolled in one of a number of subsidy programs, or otherwise subsidy-eligible, would be exempt from paying the additional fixed rate, would pay no additional volumetric rate for monthly usage less than or equal to 500 kWh per month, and a reduced volumetric rate of 1.5 cents per kWh over 500 kWh per month. Commercial, industrial, and governmental customers would pay additional fixed rates and volumetric rates scaled to the general residential rate in accordance with PREPA's current rate design.[16]

A. The Board's Hypothetical Residential Customer, Share of Wallet Calculation, and Revenue Envelope

28. To calculate the difference between PREPA's current revenues and its affordable higher revenues (i.e., the Revenue Envelope),[17] the Board first determines the *additional* fixed and volumetric rates that the Hypothetical Residential Customer could afford to pay in 2024, the first year of the Plan's implementation.[18] As discussed below in **Section IV.C**, the Board assumes that the Hypothetical Residential Customer's electricity rates are affordable if its electricity bill totals no more than 6%of its total income (i.e., a 6% "share of wallet").[19] In short, the Hypothetical

---

16 Plan of Adjustment, Schedule B, Annex 1.

17 Legacy Charge Derivation, p. 4 ("Any increase in PREPA's rates, including the Legacy Charge, cannot exceed the conceptual upper bound of affordability: the total rate that PREPA customers can pay without (1) threatening the sustainability of PREPA as a functioning utility; (2) threatening the sustainability of the Puerto Rico economy; and/or (3) subjecting customers to undue hardship (*i.e.*, making rates unaffordable to those customers). The Oversight Board has calculated the difference between the revenues from PREPA's rates in its most recent Fiscal Plan and the revenues from the notional maximum PREPA's rates could become without undermining these goals as the "Revenue Envelope." (Emphasis in original.)).

18 Legacy Charge Derivation, p. 5.

19 Legacy Charge Derivation, p. 5 ("Affordability was set at 6% of total income, or 6% "wallet share," because this 6% energy burden threshold is currently used in several mainland U.S. States as a baseline for proving support to consumers.").

Residential Customer, in the Board's view, can affordably pay no more than about $120 a month for electricity (i.e., 6% of a $2,000 monthly income).

29. The Board starts by determining the additional fixed rate the Hypothetical Residential Customer can pay, having concluded that fixed charges are "preferable as the primary instrument for raising additional revenues."[20] Specifically, the Board determines the Hypothetical Residential Customer's maximum additional fixed rate to be $21 per month, based on what it describes as a survey of fixed charges imposed by electric utilities in the mainland United States.[21]

30. The additional volumetric rates are then calculated to be the per-kWh rate increase that, after existing charges and the additional fixed rate, would bring the Hypothetical Residential Customer's total electricity bill to $120 per month in 2024. As shown in **Exhibit 1**, the Board calculates that the Hypothetical Residential Customer currently would expect to pay $96.81 per month for electricity in 2024 based on the rates in the 2022 PREPA Fiscal Plan. Adding the $21 fixed rate would bring the expected monthly bill up to $117.81, which leaves $2.19 per month that the Hypothetical Residential Customer can pay for electricity without spending more than 6% of monthly income on it. The Board applies an 0.75 cents per kWh charge to the assumed monthly usage of 425 kWh. This results in an expected monthly bill close to the $120/month threshold that the Board imposes.

31. However, because the Board assumes the Hypothetical Residential Customer consumes 425 kWh of electricity per month (which, as discussed below, is incorrect), the Board

---

[20] Legacy Charge Derivation, p. 4.

[21] Legacy Charge Derivation, p. 5 ("The fixed maximum monthly residential charge was developed using a benchmark surveying fixed charges imposed by electric utilities across the U.S. as an outer limit, among other considerations."); "Revenue Envelope and Legacy Charge Derivation Workbook," received March 11, 2023 ("Revenue Envelope and Legacy Charge Derivation Workbook").

does not derive an affordable additional volumetric rate for consumption *over* 500 kWh per month for the Hypothetical Residential Customer. Without any explanation or support, the Board assumes that the maximum additional volumetric rate for residential customers' consumption more than 500 kWh is 3 cents per kWh, or exactly four times the 0.75 cents the Board derives for residential customers' consumption less than or equal to 500 kWh.[22] In other words, the Board first uses an incorrect consumption amount to derive the affordable volumetric rate for the Hypothetical Residential Customer based on a 6% wallet share, and then does not calculate the affordable volumetric rate for higher consumption consumers.

32. The Board makes the unsupported assumption that the maximum affordable rates determined for the Hypothetical Residential Customer are also the maximum affordable rates for *all* residential non-exempt customers. Therefore, the Board proposes the same $21 fixed rate and 0.75 cents (≤ 500 kWh) and 3 cents (> 500 kWh) volumetric rates for *all* unsubsidized residential customers in PREPA's General Residential Service 112 class ("GRS 112 (General)") and General Residential Service 111 class ("GRS 111")), regardless of their household income.[23] The Board does not analyze the extent to which residential customers with annual household income *over* $24,000 can afford to pay a higher fixed or volumetric rate without spending more than 6% of their (higher) income on electricity. Put differently, the Board assumes that a residential customer who makes $240,000 a year can only afford the same $21 fixed rate and 0.75 cents (≤ 500 kWh) and 3

[22] As I discuss below, most lower income customers are exempt from portions of the Legacy Charge, and for consumption more than 500 kWh/month these customers pay half the rate of non-subsidized customers. See **Section IV**.

[23] Revenue Envelope and Legacy Charge Derivation Workbook. General Residential Service customers correspond to residential customers using electricity "for domestic uses for a residence or apartment." The class may also correspond to those in houses, apartments, and other structures "primarily intended for residential purposes, where no more than two rooms in which the total connected load does not exceed 500 watts are used by [the] tenant for business or professional purposes." See Disclosure Statement, p. 42.

cents (> 500 kWh) volumetric rates as the Hypothetical Residential Customer, who makes $24,000 a year.[24]

33. Next, the Board applies a series of adjustments and assumptions to the maximum additional fixed and volumetric rates that it calculates for the Hypothetical Residential Customer to derive the maximum additional rates for customers in all other rate classes.[25] In particular:

a. Additional fixed rates for the other customer classes were determined by using the same ratio between the additional fixed rate (derived for the Revenue Envelope) and the base fixed rate (from the 2022 PREPA Fiscal Plan) set for the Hypothetical Residential Customer and other members of the GRS 112 (General) rate class.

b. The maximum additional volumetric rates for commercial, industrial, municipal, and government rate class customers that use more than 500 kWh were calculated by multiplying the additional volumetric rate for GRS 112 (General) customers that use more than 500 kWh by an adjustment factor for each class. The adjustment factors for customer classes whose consumption is expected to be less sensitive to changes in rates (i.e., customers with inelastic demand) are higher than the

[24] I note that the variable portion of the Board's maximum rate for the Hypothetical Residential Customer on consumption more than 500 kWh will lead higher income households, who generally consume more electricity than lower income households, to pay a higher legacy charge than lower consuming customers. However, the Board never tests how this portion of the charge impacts affordability for those customers. I discuss the affordability of the Board's proposed rates in more detail in Section IV.

[25] Revenue Envelope and Legacy Charge Derivation Workbook; Legacy Charge Derivation, pp. 5-6 ("To estimate the Revenue Envelope the combination of additional fixed and volumetric charges estimated to result in the maximum additional revenue that could be generated from (non-exempt) Residential customers was then scaled to Commercial and Industrial customers, with differences in elasticities for those customer classes being taken into account.").

adjustment factors for customer classes whose consumption is expected to be more sensitive to changes in rates (i.e., customers with elastic demand).[26]

c. The maximum additional volumetric rates for commercial, industrial, municipal, and government rate class customers that use less than or equal to 500 kWh is the same.[27]

See **Exhibit 2** and **Exhibit 3**.

34. Having determined the maximum affordable additional fixed and volumetric rates for all PREPA customers, the Board then multiplies these additional rates by PREPA's net load forecast by rate class to determine the Revenue Envelope that would result from selling electricity at the higher rates.

35. The Board adjusts PREPA's net load forecast downward based on an assumption that the additional volumetric rates will cause customers to decrease their electricity consumption. The degree to which the quantity demanded for a good declines in response to an increase in price is a concept in economics referred to as the "price elasticity of demand" and is measured by an

[26] The adjustment factor derivation involves a series of steps. First, the Board calculates the average incremental Volumetric Charge for GRS 112 (General) customers based on their observed average consumption in 2021. The average incremental Volumetric Charge was $0.0105. Second, for other classes, the Board divides the GRS 112 (General) incremental Volumetric Charge by the class's long-run elasticity factor. For example, since the Board determines that the long run elasticity of Commercial GSP 212 customers would be 70% of the assumed long run elasticity of Residential customers, the Board calculates $0.0105 / 0.7 = $0.015. (In this way, lower elasticity will translate to a greater increase in the Volumetric Charge.) Third, the Board divides the result of the second step by the incremental Volumetric Charge for GRS 112 (General) customers to arrive at an adjustment factor. For GSP 212 customers, this is $0.015 / $0.03 = 0.5. Fourth, the Board calculates the adjustment factor by rounding the result of the third step to the nearest value in the set {25%, 33%, 50%, 67%, 75%, 100%}. For example, 0.5 is closest to 50%, and therefore the adjustment factor for the GSP 212 class is 50% and their maximum incremental Volumetric Charge for consumption > 500 kWh is $0.015 (= $0.03 × 0.50). See Revenue Envelope and Legacy Charge Derivation Workbook.

[27] The Board hard codes a few exceptions to this equality. The adjustment factors for ≤ 500 kWh customers from the Commercial GSS 211, Government GSS 211, and Municipalities GSS 211 class were assumed to be 50% of the Volumetric Charge rather than 100%. See Revenue Envelope and Legacy Charge Derivation Workbook.

"elasticity rate."[28] The Board determines a short-run demand elasticity of −0.2 and a long-run demand elasticity of −1.7 for residential GRS 112 (General) customers—the rate class for the Hypothetical Residential Customer—and uses those elasticities as a basis for determining the elasticities of other rate classes. To calculate the maximum revenues PREPA could collect from customers in different rate classes, the Board first estimates the decrease in electricity consumption for each rate class caused by the additional volumetric rates by reference to the elasticity rate, multiplies the additional volumetric rates by the elasticity adjusted load forecast, and adds the additional fixed rate. Summing these revenues from each rate class, the Board estimates a Revenue Envelope from 2024 to 2051 that has a net present value of $6.383 billion as of 2022.[29] **Exhibit 4** illustrates the Revenue Envelope on an annual basis, extended through 2058.

B. Revenues Remaining After the Board's Two Subtractions from PREPA's Revenue Envelope

36. According to the Board, not all of its calculated Revenue Envelope is available to service New Bonds to fund recoveries on creditors' claims. Rather, the Board determines that $1.699 billion (in net present value) must be deducted from the Revenue Envelope and instead be used for two other purposes:

a. Fixed Cost Under-Recovery: As described above, the Board claims that additional volumetric rates would, by increasing rates above those contemplated by the 2022

[28] The elasticity of demand measures the percentage change in quantity demanded for a product due to a one percent change in its price. In this case, elasticities measure the percentage change in load in response to an increase in electricity rates. An elasticity of −0.9, for example, indicates that the quantity demanded for a product decreases by 0.9 percent in response to a one percent increase in price. Consumer demand is typically more elastic in the long term, as consumers have more time to respond to price increases. The Board uses short run elasticities to adjust the load in 2024, and adjusts the load in subsequent years by assuming the elasticities increase linearly, year over year until they reach their long-run values in 2034. See Revenue Envelope and Legacy Charge Derivation Workbook.

[29] Estimating the net present value of the Revenue Envelope as of 2024, it would be $7.171 billion.

PREPA Fiscal Plan, decrease future electricity consumption below PREPA's 2022 load forecast. According to the Board, this loss of electricity sales between 2024 and 2051 would result in a revenue shortfall such that PREPA would not be able to pay all of its fixed costs, such as necessary maintenance. The Board thus proposes to use a portion of the Revenue Envelope to pay the portion of PREPA's ongoing fixed costs that it says would otherwise be unfunded because of the Elasticity Effect. The Board estimates Fixed Cost Under-Recovery to be $0.812 billion in net present value. [30]

b. Additional Capital Expense: The Board states that additional capital expense, not contemplated by the 2022 PREPA Fiscal Plan, and which the Board does not identify, will also need to be funded from a portion of the Revenue Envelope. The Board estimates these expenditures to be $0.887 billion in net present value.[31] The Board implies that, if necessary, PREPA *could* increase rates in the future to collect these amounts (the "Fixed Cost Under-Recovery" and the Additional Capital Expense),[32] but neither the Plan nor the Disclosure Statement reveal any actual

[30] Legacy Charge Derivation, p. 6 ("Applying price elasticity of demand means that, with the Legacy Charge included, PREPA's sales will trend lower than the sales projections included in the Fiscal Plan. As a consequence, the revenue PREPA earns from the remainder of its rates (other than the Legacy Charge) will be lower than those projected in the Fiscal Plan, and those lower revenues will not be sufficient to cover all of PREPA's fixed costs. Therefore, a portion of the Revenue envelope—a portion of the hypothetical additional revenues associated with the increased rates—must be allocated to general PREPA operating costs to cover lost revenue. This means that any initial estimate of the gross amount (*i.e.*, the Revenue Envelope) available for the Legacy Charge (the "outer bound" referenced above), must be reduced to allow PREPA to pay for the expected shortfall in fixed cost recovery."); Revenue Envelope and Legacy Charge Derivation Workbook.

[31] Legacy Charge Derivation, p. 7 ("A second set of reductions is related to necessary costs not currently accounted for in PREPA's Fiscal Plan. Notably, the Fiscal Plan does not include capital expenditures (and matches to federal funding) PREPA will likely need to make to remain a viable operating entity. During the Fiscal Plan term, those expenditures are estimated to total $2.425 (on an undiscounted basis)."); Revenue Envelope and Legacy Charge Derivation Workbook.

[32] Legacy Charge Derivation, pp. 3, 6.

plans to do so (or the conditions on which hypothetical rate increases to reach the extent of the Revenue Envelope might take place).

After deducting these two estimated costs from the Revenue Envelope, the Board then calculates the net present value of Revenues Remaining (from the Revenue Envelope) to be $4.684 billion for the period 2024–2051.[33] **Exhibit 5** illustrates the Revenues Remaining on an annual basis, extended through 2058.

37. These two deductions from the Revenue Envelope reflect an NPV of $1.699 billion. To the extent that these costs are not actually incurred—either because the posited Elasticity Effect is overstated, or because PREPA does not increase electricity rates later to pay for additional capital expenditures—then PREPA will not have collected revenues up to the extent of the Revenue Envelope. In that event money that could be used to repay PREPA's creditors will simply never be collected by PREPA at all.

C. The Board's Legacy Charge and Additional Net Revenues Calculations

38. As discussed, the Board proposes the Legacy Charge as a combination of additional fixed and volumetric rates that would provide PREPA with additional revenues that will generally equal the Board's estimate of $4.68 billion of Revenues Remaining over 2024–2051. The Board extends the estimated revenue collected from the Legacy Charge in 2051 to 2052–2058 to arrive at Additional Net Revenues over 35 years that have a net present value of $5.68 billion. Since the Legacy Charge is not designed to generate revenues equal to the Revenue Envelope, the Legacy Charge is substantially lower than what even the Board believes to be the maximum fixed and

33 Revenue Envelope and Legacy Charge Derivation Workbook.

volumetric rates that PREPA can affordably and sustainably collect from its customers. **Exhibit 6** illustrates the Revenues resulting from the Legacy charge on an annual basis through 2058.

39. More specifically, the Board calculates the Legacy Charge as follows:

a. For all non-subsidized Residential class customers (in rate classes GRS 111/112), the Board derives a Legacy Charge fixed rate of $13 per month (compared to the $21 per month deemed affordable by its share of wallet calculation for the Hypothetical Residential Customer) and Legacy Charge volumetric rates of 0.75 cents per kWh up to 500 kWh a month and 3 cents per kWh for incremental consumption over 500 kWh per month. The Board assumes the same Legacy Charge volumetric rates for Commercial GSS 211 customers (with a slightly higher fixed rate portion of $16.25).

b. The Legacy Charge volumetric rates for other customer classes (i.e., other than the Residential classes and Commercial GSS 211 customers) are calculated based on a "volumetric rate key" for consumption > 500 kWh.[34] That is, the volumetric rates for commercial, industrial, municipal, and government rate classes are calculated by multiplying the volumetric rate key by class-specific adjustment factors.

c. The Legacy Charge fixed rates are lower than the theoretical maximum additional fixed rates determined for the Revenue Envelope.[35] For residential customers and

---

[34] The volumetric rate key is solved for as the value that, when multiplied by the relevant adjustment factors for other rate classes to determine their volumetric rates, yields a rate design such that total resulting revenues cover the Revenues Remaining. This methodology contrasts with the Revenue Envelope, in which additional volumetric rates for GRS 112 (General) were the key for other classes. See Revenue Envelope and Legacy Charge Derivation Workbook.

[35] In the Revenue Envelope calculation, the incremental Flat Fees are all scaled by the same 5.25x proportion as the incremental Flat Fee for GRS 112 (General) customers relative to their current rates. See Revenue Envelope and Legacy Charge Derivation Workbook.

commercial GSS 211 customers, the Board assumes, without a supporting rationale, that their Legacy Charge fixed rates are 3.25 times their base fixed rates in the 2022 PREPA Fiscal Plan. For example, for GRS 112 (General) customers this is $4 × 3.25 = $13 and for GSS 211 customers, this is $5 × 3.25 = $16.25. For all other customers, the Board assumes, again without support, that their Legacy Charge fixed rates are 4 times their base fixed rates in the 2022 PREPA Fiscal Plan.

d. After determining Legacy Charge fixed and volumetric rates for 2024–2051, the Board extends the revenues over 2052–2058.[36] The Board assumes that the amount of revenue generated by the Legacy Charge each year from 2052–2058 is the same as that generated in 2051.[37]

See **Exhibit 7**.

IV. THE BOARD MISAPPLIES ITS OWN SHARE OF WALLET AFFORDABILITY THRESHOLD

40. In its determination of the Revenue Envelope and Legacy Charge, the Board emphasizes that rates must remain affordable, such that (1) PREPA's residential customers do not have to spend more than 6% of their monthly income on electricity, (2) higher rates do not cause

[36] In its calculation of Additional Net Revenues, the Board also changes the "current" year in its present value calculations to be 2024 instead of the 2022 used in the Revenue Envelope and Revenues Remaining calculations. See Revenue Envelope and Legacy Charge Derivation Workbook.

[37] Note that in the Board's Legacy Charge rate derivation, it makes an error by failing to carry-over the elasticity effect they estimated as a result of the Revenue Envelope calculations. This has the effect that the Board has underestimated the fixed and volumetric rates required to generate a net present value of $5.68 billion. Therefore, the proposed Legacy Charge will not be able to generate enough revenue to pay the New Bonds

harm to the Puerto Rico economy, (3) higher rates do not cause potential outmigration, and (4) PREPA is able to cover its costs and necessary capital expenditures.[38]

41. However, the Board does not undertake an analysis of rates that are affordable to customers other than the Hypothetical Residential Customer in 2024. As I discuss in **Section III.A**, the Board's affordability analysis starts with the assumption that the monthly electricity bill of the Hypothetical Residential Customer is affordable only if it does not exceed 6% of monthly income.[39] The Hypothetical Residential Customer posited by the Board is a non-exempt household that earns a median household income of $24,000 in 2024, and (according to the Board) can therefore afford to pay up to $120 per month for electricity.[40] The Board does not directly assess the affordability or ability to pay for any other residential customer earning above the median income, nor does the Board assess the affordability or ability to pay for any other rate class.

42. As also discussed in **Section III.A**, the Board determines the maximum affordable rates of all PREPA customers from the rates the Board deems affordable for the Hypothetical

---

[38] Disclosure Statement Hearing, In re: The Financial Oversight and Management Board for Puerto Rico, as a representative of the Commonwealth of Puerto Rico, et al., Debtors, PROMESA Title III No. 17-BK-3283-LTS, and In re: The Financial Oversight and Management Board for Puerto Rico, as a representative of Puerto Rico Electric Power Authority, Debtor, PROMESA Title III No. 17-BK-4780-LTS (Jointly Administered), United States District Court for the District of Puerto Rico, San Juan, Puerto Rico, February 28, 2023 ("Disclosure Statement Hearing"), p. 31–32, 35 ("[T]he Oversight Board has continuously emphasized it has to take into account everything to come up with what it believes is a plausible range of electric rates that people can afford and will leave room for capital expenses, avoid undue conversion to solar, make Puerto Rico competitive, and there are other factors as well I won't belabor the record with at the moment… So one difference between their use of the word "affordability" and maybe ours, we don't use it for this reason, that it's not just what certain people can afford, although that's very important. It's also all these other considerations that we have to take into account so that the Plan will be feasible and the economy will be sustainable going forward."); Legacy Charge Derivation, p. 4 ("Any increase in PREPA's rates, including the Legacy Charge, cannot exceed the conceptual upper bound of affordability: the total rate that PREPA customers can pay without (1) threatening the sustainability of PREPA as a functioning utility; (2) threatening the sustainability of the Puerto Rico economy; and/or (3) subjecting customers to undue hardship (*i.e.*, making rates unaffordable to those customers).").

[39] As discussed in **Section IV.C** this limit is of questionable validity in Puerto Rico. While I am not endorsing it, I use it in my analysis here for consistency with the Board's approach.

[40] Legacy Charge Derivation, p. 5 ("Pursuant to Fiscal Plan inflation assumptions, such median household income in 2024 is estimated to be approximately $23,824."); Revenue Envelope and Legacy Charge Derivation Workbook.

Residential Customer who consumes 425 kWh of electricity per month. First, the Board's ad hoc adjustments to the rates the Board deems affordable for the Hypothetical Residential Customer make little economic sense and do not provide a reasonable framework to assess affordability for all other customers. Second, even if one accepts the Board's ad hoc adjustments, if the Board is incorrect in its conclusions about what is affordable for the median income-earning household in Puerto Rico in 2024, then the Board is also incorrect in its conclusions about what is affordable for all PREPA customers in 2024.

43. In this section, I discuss the reasons why the Board is incorrect in their conclusions about the rates that are affordable for the Hypothetical Residential Customer. I show that the Board made inaccurate and unreasonable assumptions and calculations that understate the incremental rates that are affordable to the median income earning household in Puerto Rico in 2024, which, by extension, understates the rates that are affordable for all other PREPA customers. I also show that correcting the Board's assumptions, and otherwise adopting the Board's questionable 6% share of wallet threshold, results in a conclusion that PREPA can collect higher Additional Net Revenues, and supports a substantially higher par value of New Bonds, than the Board has proposed in the Plan.

A. The Board Overstates Electricity Consumption for its Hypothetical Residential Customer and Thereby Creates an Artificially Low Ceiling on the Legacy Charge

44. As I explain in **Section III.A**, the Board bases the maximum rates that can be charged to each customer class on the rates it deems affordable for a Hypothetical Residential Customer with an annual income of $24,000 and monthly consumption of 425 kWh. As discussed, the income of the Hypothetical Residential Consumer reflects the expected median household

income in Puerto Rico in 2024. However, the Board's assumed consumption for this median income-earning consumer is substantially overstated and is not representative of the expected *actual* consumption of a typical PREPA residential customer at that income level. This is a demonstrable error. The data shows that a household in Puerto Rico that earns $24,000 per year does not consume as much electricity as the Board claims. This error has substantial implications on the amount of Additional Net Revenues.

45. The Board's use of an inflated consumption amount has the effect of lowering the maximum rate that the Board determines PREPA could charge the Hypothetical Residential Consumer and lowering the Legacy Charge that PREPA can charge to all customers. This is because the maximum rates and the Legacy Charge are constrained by the Board's 6% share of wallet affordability assumption, which implies a maximum monthly bill of $120 for the Hypothetical Residential Customer. Therefore, if assumed consumption is overstated, the maximum rate to yield a monthly charge of $120 will be understated. And, since the maximum rates for the Hypothetical Residential Customer form the basis for the rates for all other PREPA customers, the rates for all other PREPA customers will also be understated. Correcting for the Board's miscalculation of the expected 2024 consumption of the Hypothetical Residential Customer increases the amount of Additional Net Revenues that PREPA can collect and use to repay creditor claims.

46. I explain my correction of the Board's error in the rest of this section. In **Section IV.C.1**, I explain the methodology the Board uses to determine the consumption level for the Hypothetical Residential Customer and explain the methodological mistakes in the Board's calculations. Correcting for the Board's mistakes, I find that the expected level of consumption of the Hypothetical Residential Customer in 2024 is 372 kWh, which is 12.5% lower than the level

of consumption calculated by the Board. Using the lower, more accurate consumption level, increases the Legacy Charge and the increases Additional Net Revenues that PREPA can collect to $8.96 billion. As a conservative alternative, I also estimate Additional Net Revenues to be $7.19 billion, assuming a median level of consumption in 2024 of 400 kWh. My calculations are described in **Section IV.A.2**.

1. Corrections to the Board's Analyses

47. The Board performed a calculation of the 2024 median monthly consumption of residential customers based on data provided in the 2021 Puerto Rico Community Survey ("PRCS") which corresponds to the Board's assumption of the consumption level of the Hypothetical Residential Customer (earning the median household income).[41] The PRCS reports an estimate of residential customers' total annual electricity bill and household income. The Board first calculates monthly electricity consumption of the median income earning household (earning 24,000 in 2024) as follows: (i) calculate the 2021 median annual electricity bill across households after excluding households that did not report a positive annual electricity bill;[42] (ii) divide the median annual residential electricity bill by PREPA's 2021 fiscal year electricity rates to estimate median annual residential consumption; (iii) divide the estimated annual median consumption by 12 to obtain the median monthly residential consumption in 2021, which the Board concludes was 425 kWh, and (iv) estimates the median monthly residential consumption in 2024 by reference to

---

[41] The Board asserts that it uses LUMA data to calculate median income. See Legacy Charge Derivation, p. 5. However, based on its produced workpapers, the Board relies on the PRCS data as described here.

[42] Households that did not report a bill, households with no charge or no electricity use, and households whose electricity is included in their rent or condo fee were excluded. See KWh Consumption.xlsx, FOMB_PREPA00022592.

the 2021 median monthly residential consumption.[43] The Board ultimately concludes that the 2024 median consumption is 425 kWh. I replicate the Board's calculation in **Exhibit 8**.

48. However, as I will show, when the Board estimates median annual residential consumption, it divides the median annual residential electricity bill by the incorrect electricity rates in 2021. Specifically, the Board derives a median consumption figure by dividing 2021 *calendar year* electricity bills by PREPA's 2021 *fiscal year* rates, which were in effect only until June 30, 2021. Since electricity rates were increased in fiscal year 2022, the Board should have incorporated into its calculation the higher electricity rates that were in place between July 1, 2021 and December 31, 2021.

49. To correct for the Board's error, I use the Board's methodology and recalculate 2021 median residential consumption using the average blended rate from fiscal years 2021 and 2022, rather than only the fiscal year 2021 rate. Correcting for this mistake results in a lower median residential consumption of 369 kWh in 2021. In other words, I find that the Board's estimated median consumption of 425 kWh in 2021 is overstated by 15%. My calculations are shown in **Exhibit 8**.

50. I check the robustness of my calculation in two ways. First, I repeat the calculation using the 2021 residential rates reported by the Energy Information Administration ("EIA"). The EIA reports the average annual electricity rate that residential, commercial, and industrial customers were actually charged in 2021.[44] Using the 2021 EIA rates, I find that the median

---

43 The Board estimates that 2024 median residential consumption will be 430 kWh but ultimate assumes the 2024 median residential consumption will equal 425kWh. See KWh Consumption.xlsx, FOMB_PREPA00022592.

44 See U.S. Energy Information Administration, "Puerto Rico Territory Energy Profile," last updated January 19, 2023, https://www.eia.gov/state/print.php?sid=RQ#. The EIA collects monthly revenue and sales data for residential, commercial, and industrial customers in Puerto Rico. They calculate average annual electricity rates

monthly consumption in 2021 for households with income between $20,000–$30,000 was 378 kWh (see **Exhibit 8**). This finding is 11% lower than the Board's calculation of median consumption of 425 kWh.

51. Second, in **Exhibit 9**, I present the median monthly electricity consumption based on 2021 LUMA consumption data. My findings confirm that the Board's calculation of median household consumption of 425 kWh in 2021 overstates the consumption of the median income earning residential customer. For example, after excluding observations with 0 kWh monthly consumption, I find median residential consumption in 2021 was 386 kWh in 2021.

2. *Additional Net Revenues After Correction*

52. As discussed above, using PRCS data, I estimate median monthly consumption in 2021 to be 369 kWh instead of the 425 kWh assumed by the Board. To estimate median monthly consumption in 2024, I account for changes in consumption levels over time using the Board's methodology which I show in **Exhibit 9**.[45] For example, my estimate of median consumption for the median household in 2021 based on PRCS data of 369 kWh grows to 372 kWh by 2024. The median monthly consumption using the full LUMA dataset of 356 kWh grows to 359 kWh. I use this revised monthly consumption level to re-estimate Additional Net Revenues. I also perform an alternative calculation, conservatively assuming that median consumption is 400 kWh.[46]

---

for Residential customers by dividing total revenue from Residential customers by total sales Residential customers.

45 I apply the Board's approach to infer what median 2021 consumption would be in 2024. In their approach, the Board uses data on residential gross consumption (less residential lighting savings) and the number of residential customers to calculate average consumption per customer each year 2021–2024; values from 2022–2024 are projections. The Board then calculates the year-to-year percentage changes in average consumption. To infer what median 2021 consumption would be in 2024, the Board then assumes that year-to-year percentage changes in median consumption will be the same as their calculated percentage changes in average consumption.

46 This level is above all of my alternative estimates of 2024 consumption by the Hypothetical Residential Customer.

53. Using the corrected median consumption level for the Hypothetical Residential Customer implies that PREPA can charge the Hypothetical Residential Customer a higher Legacy Charge rate than the Board estimates and not exceed a monthly electricity bill of $120, which the Board maintains is affordable. All else equal, this correction results in Additional Net Revenues of $8.96 billion, based on a 2024 median monthly consumption of 372 kWh; and Additional Net Revenues of $7.19 billion based on a median monthly consumption of 400 kWh. My findings show PREPA can collect an additional $1.51 to $3.28 billion over the amount calculated by the Board. My results are shown in **Exhibit 10**.

B. The Board Incorrectly Ignores the Effects of Inflation Over a Multi-Decade Period

54. As I explain in **Section III.A**, the Board performs a share of wallet affordability calculation based on a Hypothetical Residential Customer with annual income of $24,000 in 2024. The maximum additional fixed and volumetric rates that the Board determines are affordable in 2024 are applied for the entire 35-year projection period. The Board effectively assumes that rates that are affordable in 2024 remain the rates that are affordable for the duration of the New Bonds. This assumption is nonsensical, however, because it does not account for the effects of income growth over time. In other words, although the Board acknowledges that median income will increase by the rate of inflation between 2021 and 2024, the Board nevertheless assumes that the median income will remain constant at 2024 levels despite the Board's projection of a 1.7% annual increase in inflation over this same period.

55. The Board bases the $24,000 income level of the Hypothetical Residential Customer on an estimate of median household income in 2021, $21,967. To estimate median income in 2024, the Board adjusts the 2021 median income for inflation: "Pursuant to Fiscal Plan

inflation assumptions, such median household income in 2024 is estimated to be approximately $23,924."[47] Therefore, while the Board assumes that the income of the Hypothetical Residential Customer will grow over the 2021 to 2024 period due to inflation, the Board assumes no growth in the income of the Hypothetical Residential Customer thereafter (due to inflation or real growth). In other words, the Board assumes the median nominal income in Puerto Rico will remain *constant* at 2024 levels for 35 years—i.e., that the median household will still earn $24,000 *in 2058*. For context, median household income in Puerto Rico was approximately $14,412 in 1999, $18,314 in 2009, and $20,269 in 2018, and has never been constant over long periods of time.[48] An assumption of constant income (no growth) over 35 years is the same as forecasting a year over year *decline* in *real* income, which is income after adjusting for inflation.

56. Ignoring growth in wages over the term of the New Bonds has significant implications for the Board's calculation of Additional Net Revenue. The maximum affordable rates for the Hypothetical Residential Customer under the Revenue Envelope are determined by assuming that the Hypothetical Residential Customer can afford a $120 maximum monthly electricity bill in every year for 35 years, irrespective of inflation. All else equal, had the Board instead allowed the income of the Hypothetical Residential Customer to increase over that 35-year period, the Hypothetical Residential Customer could afford to pay more than $120 per month for electricity while staying under the Board's 6% share of wallet threshold, and thus could afford to pay higher rates over time. And since the Board determines the rates for all other customers based on the rates that are affordable to the Hypothetical Residential Customer, all other customers would

[47] Legacy Charge Derivation, p. 5.

[48] U.S. Department of Housing and Urban Development, "Comprehensive Housing Market Analysis Puerto Rico," July 2019, https://www.huduser.gov/portal/publications/pdf/CMARtables_PuertoRico_19.pdf; U.S. Bureau of Labor Statistics, "Occupational Employment and Wage Statistics," July 19, 2022, https://www.bls.gov/oes/tables.htm.

likewise be able to afford higher electricity rates also. Therefore, a reasonable increase in the income of the Hypothetical Residential Customer will increase Additional Net Revenues that PREPA can collect to service New Bonds.

1. *Corrections to the Board's Analysis*

57. As discussed above, the Board's assumption that there would be no growth in nominal income for 35 years is unreasonable (and contradicted by the Board's own forecasts for the period from 2021–2024 and the Board's own forecasts for the Puerto Rico economy at large in the Commonwealth Fiscal Plan). Therefore, I adjust the Board's calculations to allow the income of the Hypothetical Residential Customer to grow at the rate of inflation each year from 2024 to 2051 using the projected inflation rate from the 2022 PREPA Fiscal Plan.[49] I do this by recalculating the maximum affordable monthly bill of the Hypothetical Residential Customer, assuming median income grows by inflation between 2024 to 2051. Mathematically, this is equivalent to increasing the Board's estimate of the 2024 affordable monthly bill of $120 by inflation in each year. I also calculate the projected monthly bill (before Legacy Charge) for the Hypothetical Residential Customer in each year from 2024 to 2051 using the base rates and expected charges projected in the 2022 PREPA Fiscal Plan. I then calculate the additional fixed and volumetric charges that could be charged in each year from 2024 to 2051 such that the inflation

[49] The 2022 PREPA Fiscal Plan takes its measure of inflation from the 2022 Commonwealth Fiscal Plan. The Commonwealth Fiscal Plan calculates inflation as a weighted average of 50% of the U.S. inflation rate a 50% of a predicted increment. The result is an inflation rate that on average is, on approximately, −0.6% lower than the U.S. inflation rate. "2022 Certified Fiscal Plan for the Puerto Rico Electric Power Authority," June 28, 2022, FOMB_PREPA 00000699 – FOMB_PREPA 00000882, ("2022 PREPA Fiscal Plan"); Financial Oversight & Management Board for Puerto Rico, "2022 PREPA Fiscal Plan," January 27, 2022, https://drive.google.com/file/d/1STrf0ksj1Sqc54UkABGcjyrbIZvc_JEm/view ("2022 Commonwealth Fiscal Plan"), p.33; January 2022 Fiscal Plan Model Certified (Dataroom).xlsx, FOMB_PREPA00020359.

adjusted monthly electricity bill of the Hypothetical Residential Customer meets the Board's 6% Share of Wallet threshold.

2. *Additional Net Revenues after Correction*

58. **Exhibit 11** presents my calculation of the Additional Net Revenues that PREPA could collect simply by assuming that the income of the Hypothetical Residential Customer increases by the rate of inflation and otherwise leaving the Board's methodology unchanged. Assuming all else equal, Additional Net Revenues increase by $910 million, or 16% over what the Board calculates, to $6.57 billion.

C. The Board's Method of Adjusting the Maximum Rates Deemed Affordable for the Hypothetical Residential Consumer to Determine the Maximum Rates for Higher Income Residential Households is Not a Reliable Measure of Affordability

59. A 30% share of wallet for shelter costs (which includes rent or mortgage payments, insurance, and utilities) has historically been viewed as a rule of thumb threshold for housing affordability.[50] Intuitively, the threshold is intended to reflect the amount a household can spend on shelter while still being able to meet its basic non-shelter expenditures.[51] The Board's conclusion that monthly electricity costs that exceed 6% of monthly income are unaffordable is

---

50 Linneman, Peter D. and Isaac F. Megbolugbe, "Housing Affordability: Myth or Reality?" *Urban Studies* 29, nos. 3/4 (1992): 369–92; Schwartz, Mary and Ellen Wilson, "Who Can Afford To Live in a Home?: A Look at Data From the 2006 American Community Survey," Unpublished Working Paper (2008), https://acash.org.pk/wp-content/uploads/2018/09/who-can-afford.pdf for a discussion of the housing threshold ("Housing expenditures that exceed 30 percent of household income have historically been viewed as an indicator of a housing affordability problem.").

51 See, e.g., Schwartz, Mary and Ellen Wilson, "Who Can Afford To Live in a Home?: A Look at Data From the 2006 American Community Survey," Unpublished Working Paper (2008), https://acash.org.pk/wp-content/uploads/2018/09/who-can-afford.pdf for a discussion of the housing threshold ("Because the 30 percent rule was deemed a rule of thumb for the amount of income that a family could spend and still have enough left over for other nondiscretionary spending…").

based on papers that assume that household utility costs should not exceed 20% of shelter costs (20% of 30% is 6%).[52] However, these studies were based on residents in cities in the mainland US, such as New York, where housing costs are particularly high. In Puerto Rico, housing costs are significantly lower than in the mainland US (let alone New York), implying that a higher energy share of wallet is affordable in Puerto Rico (i.e., there is more room for electricity costs given the significantly lower mortgage, rent, and other shelter costs).[53] Indeed, Puerto Rico, like virtually all islands, has long had higher electricity prices than in the mainland United States due to the unique attributes of providing electricity to an island. These costs, however, are more than offset by lower total shelter costs. Accordingly, the foundation of the Board's entire affordability analysis, the 6% electricity share of wallet threshold, is not supported by the literature from which it was derived and cannot serve as the basis for a properly conducted affordability analysis.

60. Moreover, the use of a share of wallet threshold to assess affordability (no matter what threshold is used) assumes that one can determine all of a household's income based on the measurements in reported data, an assumption that is particularly problematic in Puerto Rico where the size of the informal (i.e., unmeasured) economy is often estimated to be over 20% of GNP.[54] This compares to an estimated informal economy in the mainland United States of 8% of GDP.[55] The understatement of true income in reported data implies that even the Board's Hypothetical

---

[52] Colton, Roger D., "Home Energy Affordability in New York: The Affordability Gap (2008–2010)," Working Paper (2011), https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/EDPPP/LIFE/Resources/2008-2010-affordability-gap.pdf ("The 6% is a calculated figure. It is based on the premise that utility costs should not exceed 20% of shelter costs.").

[53] 2019 Puerto Rico Community Survey and American Community Survey.

[54] Bond, Craig A. et al., "Challenges and Opportunities for the Puerto Rico Economy: A Review of Evidence and Options Following Hurricanes Irma and Maria in 2017," Rand Corporation, 2020, https://www.rand.org/pubs/research_reports/RR2600.html, pp. 108-109.

[55] Elgin, C. et al., "Understanding Informality," Centre for Economic Policy Research, 2021, C.E.P.R. Discussion Paper 16497.

Residential Customer may be able to afford more than 6% of its *measured* income. Despite these issues with the Board's 6% share of wallet threshold, I nevertheless adopt it for most of my analyses described and presented in this report. That is, even if one conservatively assumes that 6% of measured income is the right threshold for the Hypothetical Residential Customer, I demonstrate that the Hypothetical Residential Customer and other PREPA customers can afford to pay more while remaining below 6% share of wallet.

61. While the Hypothetical Residential Customer is constructed as a median residential customer, it is not *representative* of the residential customers who will actually pay the Legacy Charge. The Hypothetical Residential Customer's annual income of $24,000 is the Board's estimate of the median household income in Puerto Rico in 2024. Therefore, based on the definition of the "median," approximately 50% of residential customers (or 46% of all PREPA customers[56]) will have incomes higher than $24,000. It is logical that customers with higher incomes can afford to pay more, yet the Board does not assess the affordable rate for households earning above $24,000 and rather proposes that all residential customers pay the same rates the Board deems are affordable to the Hypothetical Residential Customer. For example, notwithstanding the fact that higher income customers would be more likely to pay the higher volumetric rate for consumption over 500 kWh/month, these customers are paying much less than 6% of income for electricity. **Exhibit 12** uses the PRCS to estimate share of wallet for customer groups starting at the median income level. **Exhibit 12** clearly demonstrates that higher income customers continue to spend a much lower share of income on electricity than the Hypothetical

[56] Residential customers are approximately 92% of PREPA customers. See Revenue Envelope and Legacy Charge Derivation Workbook.

Residential Customer, even taking into consideration the Board's estimation of the maximum rate.[57]

1. Corrections to the Board's Analysis

62. One way to address the above affordability disparity between the Hypothetical Residential Consumer and higher income earning residential customers is to adjust the ratio of the fixed and volumetric portions of the maximum affordable rate that the Board estimated. The Board's selection of $21 for the fixed portion of the maximum rate results in approximately 87% of the Revenue Envelope being collected through the additional fixed charges. While the Board argues that a high fixed proportion of the rate is somehow optimal, they provide no analysis that supports this assertion beyond benchmarking the maximum fixed rates charged by other utilities.

63. To illustrate the sensitivity of the amount of Additional Net Revenues to the Board's precise chosen mix of fixed versus volumetric charges, I have adjusted that ratio and estimated the impact of such a change on Additional Net Revenues. I test two alternatives of fixed rate to volumetric rate ratios. In the first, I reduced the fixed charge proportion of the maximum affordable rate from 87% for the Hypothetical Residential Customer (the Board's rate structure) to 80%, and in the second I further reduce the fixed charge proportion to 75%. These correspond to a fixed monthly charge for residential customers of $19.35 and $18.14 respectively. In each scenario, I then set the volumetric rates for other residential customers using the same methodology

---

57 The approximately 50% of residential customers who earn less than $24,000 per year are largely exempt from paying any Legacy Charge (except for consumption over 500 kWh per month, at half the rate other residential customers would be charged for such consumption). Residential customers in the RH3, LRS, RFR, and GRS 112 (LC Subsidy Eligible) classes are exempt from the Incremental Flat Fee and the Incremental Volumetric Charge for consumption $\leq$ 500 kWh. These customer classes are assumed to have an Incremental Volumetric Charge (half that of GRS 112 (General) customers) for additional consumption > 500 kWh. See Revenue Envelope and Legacy Charge Derivation Workbook.

as the Board, and also adjust fixed and volumetric rates for other customers using the Board's methodology.

2. Additional Net Revenues After Correction

64. **Exhibit 13** presents the results of my calculations assuming alternative fixed and volumetric proportions. I find that, all else equal, decreasing the fixed charge proportion for the Hypothetical Residential Customer to 80% leads to Additional Net Revenues of $5.75, and decreasing the fixed charge proportion for the Hypothetical Residential Customer to 75% leads to Additional Net Revenues $5.80 billion. This represents an increase of $70 to $120 million over the Boards estimate of $5.68 billion.

D. The Board's Method of Adjusting the Maximum Rates Deemed Affordable for the Hypothetical Residential Consumer to Determine the Maximum Rates for Commercial, Industrial, Government, and Municipal Customers is Not a Reliable Measure of Affordability

65. As discussed, the Board makes adjustments to the rates it deems affordable for the Hypothetical Residential Customer to determine the rates for all other customer classes. However, the Board's determination of rates based on a 6% share of wallet calculation for the Hypothetical Residential Customer has no logical connection to what commercial, industrial, government, and municipal customers can afford to pay for electricity. While these customer classes make up only 8.3% of PREPA's total customer base, they consume approximately 56.3% of the electricity supplied by the PREPA grid.[58] Determining the maximum affordable rates for these customer classes by way of a residential share of wallet calculation is illogical and has no support in the

[58] Revenue Envelope and Legacy Charge Derivation Workbook.

literature. As I show below, commercial and industrial customers likely can afford to pay much more than what the Board has proposed.

1. Corrections to the Board's Analysis

66. In this section, I use financial data to evaluate the additional fixed and volumetric rates that commercial and industrial customers could reasonably afford to pay. Specifically, I obtain data from the US Census Bureau ("USCB") and estimate the ratio of electricity costs to total operating costs for manufacturing firms in Puerto Rico as of 2017. I use this information to evaluate the proposed increase in electricity costs for non-residential customers from the Board's proposed Legacy Charge and maximum charges under the Revenue Envelope relative to firm total operating costs.

67. **Exhibit 14** shows my calculations of the estimated monthly consumption and electricity costs for commercial, industrial, government, and municipal customers as of 2024. For example, I show the 2024 median monthly electricity consumption of customers in commercial class GST 213[59] is expected to be 225,000 kWh.[60] I then multiply the median level of consumption by the base rates forecasted in the 2022 Fiscal Plan (i.e., rates before the addition of the Legacy Charge), which yields a median monthly base level cost of electricity for class GST 213 of $45,995.51 in 2024.[61] I similarly calculate the median monthly cost of electricity using the Board's

59 GST 213 rate class: connected to the transmission system that have a demand of 250 kVA or greater, for general uses, e.g., motive power, heating, refrigeration, and incidental lighting of industries, hotels, and any other establishment. Puerto Rico Electric Power Authority, "Electric Service rates and Riders," available at: https://lumapr.com/wp-content/uploads/2023/02/Tariff-Book-Electric-Service-Rates-and-Riders-Revised-by-Order-05172019-Approved-by-Order-05282019.pdf.

60 I calculate the 2024 median consumption as follows: I start with the 2021 median consumption of each rate class based on LUMA data and grow consumption to 2024 using the same methodology as the Board uses to grow residential consumption from 2021 to 2024.

61 See Column A, Exhibit 14.

estimate of the maximum affordable rates that class GST 213 could be charged, which is $50,608.00.[62] Lastly, I calculate the median monthly cost of electricity based on the additional Legacy Charge that the Board estimated for class GST 213, which is $49,978.01.[63] Although the percent increases in the monthly bill after adding the Legacy Charge appear large, the relative cost of electricity for these rate classes is only a small percentage of total operating costs. Therefore, the Legacy Charge increases total operating costs by a very small amount, as I explain below.

68. **Exhibit 15** shows that electricity costs for manufacturing firms in Puerto Rico as a percentage of total operating costs is approximately 2.47%. Manufacturing is an important contributor to the Puerto Rico economy as it constitutes 49% of its GDP.[64] In **Exhibit 15**, I estimate the increase in operating costs of manufacturing companies from an increase in the monthly cost of electricity based on the maximum rates estimated by the Board, and separately the increase in the monthly cost of electricity assuming the Board's Legacy Charge. I find that the relative size of energy costs compared to operating costs in the manufacturing industry increases by only 0.62 percentage points if the Board's maximum rates are charged and by 0.48 percentage points with the Board's proposed Legacy Charge.

69. Taken together, the change in electricity costs associated with the Board's maximum affordable rates and Legacy Charge rates is very small. Therefore, it is likely that non-residential customers can afford to pay more for electricity, and that increasing electricity rates for these customers could generate greater Additional Net Revenues for debt service. Below I

---

62 See Column B, Exhibit 14.

63 See Column C, Exhibit 14.

64 Commonwealth of Puerto Rico Office of the Governor Planning Board, "Statistical Appendix of the Economic Report to the Governor and to the Legislative Assembly," 2021.

calculate the Additional Net Revenues associated with hypothetical increases in the Legacy Rates charged to non-residential customers.

2. Additional Net Revenues After Correction

70. I estimate the increase in Net Additional Revenues that would result from a hypothetical increase of one cent and 2.5 cents to the maximum rate that could be charged to non-residential customers. I find that an increase of up to 2.5 cents has a small effect on customer's operating costs. **Exhibit 15** shows electricity costs relative to operating costs, when a one cent per kWh charge is added to the Board's maximum volumetric rates for industrial, commercial, municipal, and government customers, is approximately 3.21% for manufacturing companies. When 2.5 cents per kWh is added to the Board's maximum volumetric rates, the results are similar, with electricity costs at 3.35% of operating costs for the manufacturing sector in Puerto Rico.

71. **Exhibit 16** presents Additional Net Revenues from adding one cent and 2.5 cents to the Board's maximum volumetric rate. Adding one cent per kWh to the Board's maximum volumetric rates for all commercial, industrial, municipal, and government rate classes results in an approximately $471 million increase in Additional Net Revenues; adding 2.5 cents to the Board's maximum volumetric rates results in an approximately $1.068 billion increase in Additional Net Revenues.

72. These results suggest that PREPA can affordably collect more in Additional Net Revenues by increasing rates for non-residential customers, over and above the maximum rates the Board claims can theoretically be charged under the Revenue Envelope. These additional rates would not affect the affordability calculation for residential customers, as the rates for those customers are assumed unchanged.

V. MORE REALISTIC DEMAND FORECASTS INCREASE THE ADDITIONAL NET REVENUES

73. To determine the Revenue Envelope, the Board multiplies the additional fixed and volumetric rates it determines are affordable for each customer rate class by the forecast of PREPA electricity demand for each customer rate class. The forecasts used by the Board reflect a decline in the future demand for electricity, which means that electricity bills become more affordable in the future (that is, since the Board's Legacy Charge is constant over time, as the amount of electricity consumed declines, electricity costs as a share of wallet also decline and are therefore more affordable to PREPA's customers). A forecast of electricity consumption that is overly pessimistic or understated will reduce the amount of Additional Net Revenues PREPA will be able to collect even though monthly bills are lower than the Board's purported thresholds of affordability.

74. In her expert report, Dr. Tierney discusses the flaws in the demand forecasts used by the Board and concludes that those forecasts understate the demand for electricity in future years. According to Dr. Tierney, the forecasts are based on unfounded and unreasonable assumptions related to the adoption of energy efficiency measures, distributed generation (principally, rooftop solar panels), and electric vehicles by PREPA customers over the forecast period which collectively "greatly underestimate[] PREPA's future sales of electricity."[65] Further, Dr. Edwards discusses other overly pessimistic inputs used to create the 2022 Certified PREPA Fiscal Plan forecast. For example, Dr. Edwards opines that PREPA's load forecasts are based on

[65] Expert Report of Susan Tierney, April 28, 2023 (hereafter "Tierney Report"), Section V.B.

forecasts of future growth in Puerto Rico's GNP that use an inappropriate methodology and implausibly predict a multi-decade economic recession in Puerto Rico.[66]

75. Dr. Tierney discusses three revised net load forecasts that correct for some of the flaws that understate the future demand for electricity that the Board relies on to calculate the Revenue Envelope.[67] In this section, I use the revised net load and base rate projections presented in the Tierney Report to recalculate Additional Net Revenues, all else equal.[68] These revised forecasts are discussed in the expert report of Dr. Tierney and in more detail below.[69] My analysis using all three of these revised net load forecasts meet the threshold of the Board's standard of affordability for PREPA's customers.

1. Corrections to the Board's Analysis

76. The first revised net load forecast from Dr. Tierney's report uses more realistic assumptions regarding expectations (1) of the rate of customer adoption of energy efficient technologies that lower electricity consumption from PREPA; (2) of the rate of customer adoption of distributed generation technology, primarily rooftop solar; and (3) of the rate of customer adoption of electric vehicles.[70] While the 2022 Certified PREPA Fiscal Plan includes two forecasts, the Base Case and the Alternative Forecast, for each of these three categories of technology, the Board only considers the Base Case in its calculation of the Revenue Envelope

[66] Tierney Report, Section V.A; Expert Report of Sebastian Edwards, April 28, 2023 (hereafter "Edwards Report"), Section IV.B.

[67] Tierney Report, Section V.C.

[68] Tierney Report, Section V.C, Appendix D, and Appendix E.

[69] Tierney Report, Section V.C.

[70] Tierney Report, Section V.B.

and Legacy Charge.[71] Dr. Tierney's first revised net load forecast is based on PREPA's Alternative Forecast, which Dr. Tierney opines is based on more realistic assumptions regarding the adoption of efficient energy, solar, and electric vehicles by PREPA customers. Dr. Tierney also uses the load resulting from her revised net load forecast to adjust the 2022 PREPA Fiscal Plan base rates.[72] I then use these adjusted base rates to re-calculate Additional Net Revenues while maintaining all other assumptions in the Board's methodology.

77. The second and third revised net load forecast from Dr. Tierney's report build on the first revised net load forecast and additionally adjusts PREPA's forecasted gross load for two different projections of future GNP growth that are discussed in the expert report of Sebastian Edwards.[73] Dr. Edwards's two projections include one higher forecast produced by the Board and one forecast produced by his own model.[74] Once again, Dr. Tierney uses the revised net load forecasts from the second and third alternatives to adjust the 2022 PREPA Fiscal Plan base rates.[75] I then use these adjusted base rates to re-calculate Additional Net Revenues, all else equal.

2. Additional Net Revenues After Correction

78. **Exhibit 17** presents my calculation of the Additional Net Revenues based on the three revised net load forecasts discussed in the Tierney Report that revise assumptions underlying the understated Base Case forecasts of future electricity consumption. The Additional Net

[71] Tierney Report, Sections IV.B and V.B.

[72] Tierney Report, Section V.C, Appendix D, and Appendix E.

[73] Tierney Report, Sections V.A and V.C; Edwards Report, Sections IV.F and V.B.3.

[74] Edwards Report, Sections IV.F and V.B.3.

[75] Tierney Report, Section V.C, Appendix D, and Appendix E.

Revenues range from $5.75 billion to $6.24 billion, an increase of approximately $70 million to 500 million over the amount calculated by the Board.

VI. THE BOARD UNDERSTATES ADDITIONAL NET REVENUES BY APPLYING ELECTRICITY ELASTICITY ASSUMPTIONS THAT ARE NOT SUPPORTED BY THE RELEVANT LITERATURE

79. The impact of a rate increase on PREPA sales was "[a]n important consideration"[76] for the Board.[77] The Board claims that "the higher PREPA's rates are, the more PREPA's rates incentivize customers to choose alternatives."[78] The Board asserts higher rates may reduce customer loads in three ways:

a. Customers who stay on the PREPA grid may reduce their energy consumption, by, for example, increasing their energy efficiency or using electricity generated by solar PV;

b. Customers may leave the PREPA grid by taking complete responsibility for their own electricity generation; or

c. Customers may leave the PREPA grid by leaving Puerto Rico.[79]

---

[76] Legacy Charge Derivation, p. 3 ("An important consideration for the Oversight Board in designing the Legacy Charge was the impact that increasing PREPA's rates would have on PREPA's sales.").

[77] Disclosure Statement, pp. 345–46 ("The Debtor believes that the Plan is "fair and equitable" because the creditor recoveries proposed therein have been calculated … to reasonably compensate Holders of Claims while enabling the Debtor to, among other things, … avoid driving customers from the grid.").

[78] Legacy Charge Derivation, p. 3; Disclosure Statement, p. 369 ("Moreover, the increase in rates due to the Legacy Charge may also reduce demand, which in turn will reduce Net Revenues and the ability to make payments on the New Bonds.").

[79] Legacy Charge Derivation, p. 2 ("[H]igher rates, and the resulting higher bills for customers, ultimately induce customers to reduce their consumption of electricity from PREPA (including notably by reducing electricity generated by solar PV installed at their premise), "cut the cord" from the grid entirely either through taking full responsibility for their electricity generation or even out-migrating from Puerto Rico.").

The Board also cautions that higher electricity rates could result in an outcome where residential and commercial customers are "unable to pay all or part their electricity bills."[80]

80. The Board incorporates customer consumption responses to higher electricity rates into its Revenue Envelope calculation by downwardly adjusting load based on assumptions about price elasticities of demand. As I explain in **Section III.A**, the price elasticity of demand is the percentage change in customers' quantity demanded due to a one percent increase in electricity rates. The Board asserts that lower consumption (and thus lower sales and revenues collected by PREPA) due to higher electricity rates will "[cause] a shortfall in the (non-Legacy Charge) revenues available to cover fixed costs,"[81] i.e., Elasticity Effect, or Fixed Cost Under-Recovery. On a net present value basis, the Board claims the revenue shortfall is $812 million, which the Board subtracts from the Revenue Envelope. However, Dr. Tierney explains that the Board overestimates the demand response to increases in electricity rates, and therefore overestimates the impact of an increase in volumetric rates on load and Fixed Cost Under-Recovery.[82] She also shows that the Board's assumed electricity elasticity rates are above the rates cited in academic literature.[83]

81. The Board assumes a short run elasticity of −0.2 and a long-run elasticity of −1.7 for the general residential customer class (GRS 112). **Exhibit 18** presents the elasticities report in the Tierney Report from the academic literature, which are much smaller than those assumed by

---

80 Disclosure Statement, p. 361 ("High electricity rates may lead residential and commercial customers to use less electricity or to be unable to pay all or part of their electricity bills.").

81 Legacy Charge Derivation, p. 6 ("The effect of price elasticity resulting from the Legacy Charge is expected to reduce kWh sales otherwise projected in the Fiscal Plan, causing a shortfall in the (non-Legacy Charge) revenues available to cover fixed costs.").

82 Tierney Report, Section VII.

83 Tierney Report, Section VII.B and Appendix F.

the Board.[84] The effect of a higher elasticity assumption is a smaller Revenue Envelope and less Additional Net Revenues for serving New Bonds.

82. In this section, I correct the Board's elasticity assumption with a long-run price elasticity estimate that is consistent with findings in the academic literature as reported by Dr. Tierney.

1. Correction of the Board's Analysis

83. The Board assumes that each rate class, including the rate sub-classes, has its own elasticity. For example, the Board assumes that commercial customers GSP 212 have a long run elasticity of –1.19 and commercial customers GST 213 have a long run elasticity of −1.7. Based on the Burke and Abayasekara (2018) elasticities reported in **Exhibit 18**, I recalculate Additional Net Revenues assuming that all residential customers have a long run price elasticity of –1.0, that all commercial customers have a long run elasticity of −0.6, and all industrial customers have an elasticity of −1.2; further, I assume that all customers have a short run elasticity of −0.10. I also recalculate Additional Net Revenues based on the residential estimates from Zhu et al. (2018). In particular, I assume that residential customers have a short run elasticity of −0.228 and a long run elasticity of −0.577. I then assume that the other customer classes have price elasticities relative to the residential class consistent with the ratios derived by the Board in their Revenue Envelope elasticity calculations.[85]

84. The Board also uses its assumed elasticities in an unsupported way: the Board's elasticities are the "scales" it uses to adjust its claimed affordable additional maximum volumetric

---

84 Tierney Report, Appendix F.

85 Revenue Envelope and Legacy Charge Derivation Workbook.

rate PREPA could charge the Hypothetical Residential Consumer to derive the affordable volumetric rate for all other rate classes. Although I find no logic in the Board's application of elasticities in this way, I nevertheless follow the Board's unsound method for purposes of re-estimating the Additional Net Revenues. See **Section III**.

2. Additional Net Revenues After Correction

85. **Exhibit 19** presents my calculations of the Additional Net Revenues using the elasticity estimates in the academic literature and discussed by Dr. Tierney in her expert report. Specifically, I find that Additional Net Revenues increase to 5.97 billion, an increase of approximately $290 million over the amount calculated by the Board.

VII. THE BOARD UNDERSTATES ADDITIONAL NET REVENUES BY ADOPTING OVERSTATED AND OUTDATED ASSUMPTIONS FOR REQUIRED CAPITAL EXPENDITURES

86. The forecasts contained in PREPA's Fiscal Plans, including the 2022 PREPA Fiscal Plan, include future capital expenditures necessary for the continued operation of PREPA.[86] To the extent these capital expenditures are to be funded by revenue from PREPA's customers, the cost of these capital expenditures is reflected in the base electricity rates projected in the 2022 PREPA Fiscal Plan.[87] While the Board states that the Revenue Envelope is calculated "based on the sales projections contained in the [2022 PREPA Fiscal Plan] for the next 35 years,"[88] the Board also claims that the 2022 PREPA Fiscal Plan does not include all of the capital expenditures that

[86] 2022 PREPA Fiscal Plan, pp. 81–82; 95–96.

[87] 2022 PREPA Fiscal Plan, pp. 85–87; 93; 159. (Federal funding has been identified as playing a "critical role in mitigating the burden of [capital] costs on ratepayers.")

[88] Legacy Charge Derivation, p. 6.

PREPA will likely need to make to remain operational.[89] The Board further claims that "the need to leave room in the rates to raise money for capital expenses is critical."[90] The Board therefore subtracts $887 million in net present value from its estimate of the Revenue Envelope, to allow room to raise rates in the future, if necessary, to pay for these additional capital expenses. These expenditures directly reduce the Board's estimate of Revenues Remaining and Additional Net Revenues.[91]

87. In her report, Dr. Tierney discusses the additional capital expenditures that the Board asserts are necessary.[92] Dr. Tierney concludes that these additional capital expenditures are not documented or explained and are therefore unreasonable.[93]

VIII. ADDITIONAL NET REVENUES PREPA CAN COLLECT TO PAY CREDITORS

88. In this section, I summarize my calculations of Additional Net Revenues based on the individual changes discussed above, and in combination with each other. To summarize, I made seven primary corrections:

A. Correcting the consumption level of the Hypothetical Residential Customer;

B. Correcting the Board's failure to consider affordability in future years beyond 2024;

---

89 Legacy Charge Derivation, p. 3 ("The Oversight Board considered future rate increases that would need to be made to fund anticipated capital expenditures, operating expenses, funding of pensions and other costs (such as federal funds matching) necessary to keep PREPA operational.").

90 Disclosure Statement Hearing, p. 31.

91 Legacy Charge Derivation, p. 7; Revenue Envelope and Legacy Charge Derivation Workbook.

92 Tierney Report, Section VIII.

93 In addition, Dr. Tierney also reviewed the capital expenditures contained in the 2022 PREPA Fiscal Plan. Dr. Tierney explains that the capital expenditures included in the 2022 PREPA Fiscal Plan rely on an outdated forecast that has since been updated by LUMA. I have not quantified the effect of this outdated forecast. See Tierney Report, Section VIII.A.

C. Correcting the Board's unsupported elasticity assumptions;

D. Correcting the Board's failure to capture more revenue from higher earning residential customers;

E. Correcting the Board's ad hoc approach for estimating affordable rates for Commercial and Industrial customers

F. Correcting the Board's unsupported capital expenditure estimates; and

G. Correcting the Board's overly pessimistic load projections.

89. In **Table 1**, which I also provided above, I summarize the individual impact of each of the above corrections.

TABLE 1
"ADDITIONAL NET REVENUES" FOLLOWING CORRECTION OF ERRORS MADE BY THE BOARD

		Incremental "Additional Net Revenues" Beyond Board Proposal ($ Millions)
[A]	Corrected Hypothetical Residential Consumer Monthly Consumption	$1,508–$3,279
[B]	Corrected the Board's Failure to Consider Affordability in Future Years Beyond 2024	$892
[C]	Corrected Elasticity Estimates	$290–$581
[D]	Corrected Ability to Capture Revenue from Higher Earning Residential Customers	$70–$122
[E]	Corrected Approach for Estimating Affordable Rates for Commercial and Industrial Customers	$471–$1,068
[F]	Corrected Capital Expenditure Estimates	$887
[G]	Corrected Load Projections	$70–$564

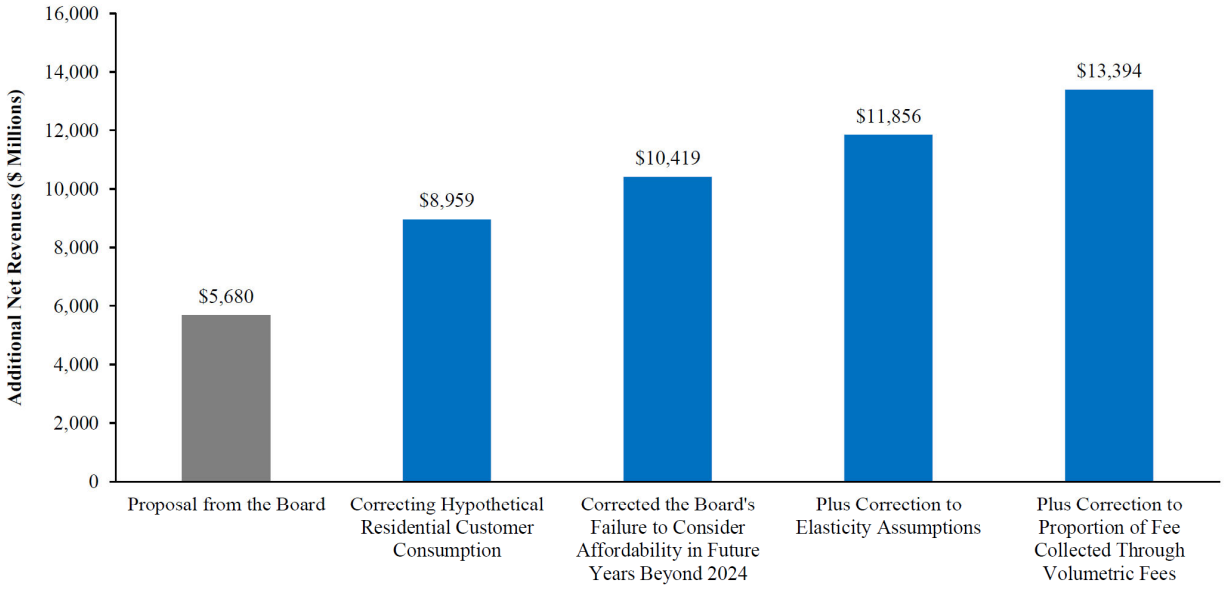
Sources:

[1] Disclosure Statement.
[2] Revenue Envelope and Legacy Charge Derivation Workbook.
[3] Puerto Rico Community Survey.
[4] Zhu, Xing, Lanlan Li, Kaile Zhou, Xiaoling Zhang, and Shanlin Yang. "A meta-analysis on the price elasticity and income elasticity of residential electricity demand," *Journal of Cleaner Production*, no. 201 (2018): 169−77.
[5] Burke, Paul J. and Ashani Abayasekara,"The Price Elasticity of Electricity Demand in the United States: A Three-Dimensional Analysis," *The Energy Journal* 39, no. 2 (2018): 126−46.
[6] Edwards Report.
[7] Tierney Report.

90. In **Figure 1**, repeated here, I illustrate the effect of combining the first four of these corrections on Additional Net Revenues. As noted above, the combinations of these corrections

can have compound effects, such that impact of two or more corrections can add to more than the arithmetic sum of the individual effects. Starting with the correction to the consumption level of the Hypothetical Residential Customer, shown in the first bar, I then add the impact of accounting for the Board's failure to consider affordability over the next 35 years, which is shown in the second bar. In the third bar, I add the impact of correcting for the Board's unsupported elasticity estimates. Lastly, I add the effect of changing the proportion of the rates collected through fixed and volumetric charges. The final bar demonstrates that the impact of these four corrections more than doubles the amount of Additional Net Revenue that was calculated by the Board.

FIGURE 1
COMPOUND IMPACT ON "ADDITIONAL NET REVENUES" FOLLOWING CORRECTION OF SELECT ERRORS MADE BY BOARD



Note: The elasticity correction uses the Zhu et al. (2018) elasticity estimates.

Sources:
[1] Disclosure Statement.
[2] Revenue Envelope and Legacy Charge Derivation Workbook.
[3] Puerto Rico Community Survey.
[4] Zhu, Xing, Lanlan Li, Kaile Zhou, Xiaoling Zhang, and Shanlin Yang. "A meta-analysis on the price elasticity and income elasticity of residential electricity demand," *Journal of Cleaner Production*, No. 201 (2018): 169-177.

91. Based on these four corrections alone, I conclude that the Board has significantly understated the Additional Net Revenues that PREPA can reasonably collect from the implementation of an affordable Legacy Charge, as defined by the Board.

Dated: April 28, 2023

Maureen M. Chakraborty, PhD

APPENDIX A

MAUREEN M. CHAKRABORTY, PH.D.
Managing Principal

Phone: 212 492 8105
Fax: 212 492 8188
maureen.chakraborty@analysisgroup.com

151 West 42nd Street
23rd Floor
New York, NY 10036

Dr. Chakraborty is an economist with an extensive background in economics, finance, accounting, and valuation. She has been retained both as an expert witness and as a consultant in a number of matters involving equity and fixed income securities, valuation, solvency, fraudulent conveyance, and economic damages. Dr. Chakraborty has conducted analyses in matters involving bankruptcy, mergers and acquisitions (M&A), tax and transfer pricing, international arbitrations, fraud, and theft of trade secrets and misappropriation. Her work has involved the development of financial and economic models, the evaluation of large datasets, and the application of statistical methods to a variety of complex problems. She has worked on matters involving companies in many industries, including financial services, energy, retail, and pharmaceuticals.

EDUCATION

Ph.D.	Economics, University of Notre Dame, Notre Dame, IN
B.A.	Economics, Colby College, Waterville, ME

PROFESSIONAL EXPERIENCE

2003–Present	Analysis Group, Inc., New York, NY
1995–2003	PricewaterhouseCoopers LLP, Dallas, TX *Dispute Analysis & Investigations (1997–2003)* *Dispute Analysis & Corporate Recovery Group (1995–1997)*

SELECTED CONSULTING EXPERIENCE

Valuation / Mergers & Acquisitions

- Valued numerous privately held companies using discounted cash flow and market multiple approaches in a variety of industries including energy, telecom, pharmaceutical, retail, and banks and other financial institutions.
- Developed models to assess forecasting uncertainty, majority and minority holding positions, illiquidity, and blockage discounts.
- Evaluated the reasonableness of financial projections and cash flows prepared for purposes of assessing value.
- Evaluated the economic fairness of deal terms in the contexts of acquisitions and hostile bids, including disputes in the Delaware Court of Chancery.

APPENDIX A

- Assisted a special committee with topics related to valuation for purposes of evaluating a proposed acquisition offer.
- Assessed the reasonableness of the defensive measures taken by a board of directors in a hostile bid.
- Analyzed the economic circumstances and valuation implications arising from material adverse change (MAC) and material adverse events (MAE).
- Analyzed the financial implications of a proposed merger on a company's creditworthiness, liquidity, and ability to raise capital.

Bankruptcy and Solvency Analysis

- Assessed the solvency of numerous companies based on a comparison of the fair market value of assets and liabilities, ability to pay debts as they come due, and capital adequacy.
- Assessed companies' access to liquidity and capital, their ability to monetize or sell assets, and their ability to restructure debt.
- Analyzed the reasonable equivalent value of assets disposed in periods leading up to an event of insolvency or bankruptcy.
- Evaluated the price impact of asset sales in distressed situations.
- Prepared oil price forecasts and evaluated conditions affecting the supply and demand for oil and gas for purposes of evaluating corporate restructuring plans.
- Developed an economic framework and models to forecast the economic growth of Puerto Rico for purposes of assessing fiscal surplus and ability to repay creditors in connection with the restructuring proceedings of the Commonwealth and related entities.
- Developed a "liquidation comparator" to evaluate potential shareholder claimant and creditor recoveries in a hypothetical liquidation of Steinhoff International Holdings N.V. Valued Steinhoff's assets and liabilities and modeled intercompany flows of value between the Steinhoff corporate entities.
- Provided financial analysis to evaluate the reinstatement of senior debt proposed in the *Joint Plan of Reorganization of Spectrum Jungle Labs Corporation, et al., Debtors* (the Plan). Provided analysis demonstrating that the Plan would violate certain provisions of the Senior Secured Lenders' Credit Agreement.

Securities

- Evaluated issues related to loss causation, market efficiency, class certification, and damages in a number of securities litigation cases involving both equity and fixed income securities. Provided assistance with settlement discussions and mediations, as well as filed expert reports and provided testimony.
- Constructed a stream of counterfactual share prices based on counterfactual market disclosures.
- Examined trading strategies, statistical patterns in trading activities, the timing of information disclosure (public and non-public) relative to trading patterns and securities prices, and the impact of large volume trades on securities prices.
- Assessed the market efficiency for traded securities.

APPENDIX A

- Valued a number of complex securities, including tranches of collateralized loan obligations, executive stock options, mortgage-backed and other asset-backed structured securities, auction rate securities, credit linked notes, and sovereign debt.
- Analyzed and valued derivative securities including futures, forwards, options, and swaps.
- Evaluated the risk of auction rate failure, the liquidity of auction rate securities, and the ultimate collapse of the auction rate securities market.
- Investigated and analyzed many economic issues arising from the 2008 financial crisis, including the causes and foreseeability of the severity of the economic crisis, the effect of the crisis on hedge fund strategy and performance, and the impact of the crisis on repo financing, leverage, margin, and asset values.

Tax and Transfer Pricing

- Assessed an arm's length royalty rate using the comparable profits method and the comparable uncontrolled transaction method to inform the economic reasonableness of a profit split between corporate functions for tax purposes.
- Valued the outbound transfer of a customer relationship intangible from a large global securities custody business to a foreign subsidiary following the merger of two financial companies.
- Valued the transfer of intangible property associated with a foreign owned branch of a global custody and collateral management business to a newly established foreign bank subsidiary.
- Assessed the fair market value of Class A common units in a partnership for trust administration and tax compliance purposes.
- Provided economic and financial analysis on behalf of GlaxoSmithKline in a long-running transfer pricing dispute with the Internal Revenue Service (IRS). Supported experts in the valuation of pharmaceutical drugs at various stages of development and sales cycles, the valuation of a sales and marketing team, and a study of M&A activity in the pharmaceutical industry.
- Quantified the expected tax benefits relating to various research and development (R&D) activities on behalf of a large airline.

Economic Damages

- Provided analysis and testimony on damages in matters involving theft of trade secrets and misappropriation, as well as in claims related to violations of non-compete and non-solicitation agreements.
- Quantified economic damages in a variety of disputes arising from defamation and reputational harm, employment disputes, contract disputes, investment allegations, and fraud claims.
- Evaluated alleged economic harm from a failed merger.

Antitrust

- In a high-profile debate over the effects of market power in the online advertising market, provided analytical and empirical support to academic affiliate Susan Athey in an examination of the ways in

APPENDIX A

which online search platforms compete for advertising; an analysis of the online advertising auction pricing mechanism and the ability to exert monopoly power over pricing in the relevant market; and the development of a framework to assess the effects of monopoly power on consumer surplus, output, and quality. Professor Athey testified before the Department of Justice (DOJ) on issues relating to competition among search advertising platforms.

- Evaluated a damages claim from alleged price discrimination in a major pharmaceutical industry Robinson-Patman Act litigation matter. Analysis involved a critique of a theoretical economic model and the damage model used to quantify the alleged damages. Other tasks involved researching market trends, defining and calculating the incremental costs of operating chain store and grocery store pharmacies, and analyzing non-discriminatory prices for the industry.

PUBLICATIONS

"Calculating Damages in Broker Raiding Cases," with John D. Finnerty and Michael J. McAlister, *Stanford Journal of Law, Business & Finance*, Vol. 11, No. 2, 261–297 (Spring 2006)

APPENDIX B

MAUREEN M. CHAKRABORTY, PH.D.
Managing Principal

Expert Testimony Given
As of April 28, 2023

DEPOSITION TESTIMONY

- ***In re: LATAM Airlines Group S.A., et al.***
  US Bankruptcy Court, Southern District of New York (2022)
- ***BDO USA, LLP v. Everglade Global, Inc.***
  Court of Chancery of the State of Delaware (2022)
- ***NMR E-Tailing LLC v. Oak Investment Partners, et al.***
  Supreme Court of the State of New York, New York County (2020)

TRIAL / ARBITRATION TESTIMONY

- ***In re: Purdue Pharma L.P., et al.***
  US Bankruptcy Court, Southern District of New York (2021)
- **Confidential arbitration**
  Provided testimony regarding damages arising from a sale of a large block of publicly traded stock. Utilized an options-based approach to estimate the price risk associated with the sale of the block of equity units. (2020)
- **Confidential arbitration**
  Provided written direct testimony regarding the solvency of a real estate holding company (2019)
- **Confidential JAMS arbitration**
  Assessed a bargaining framework used to assess allegations of fraud (2019)

APPENDIX C

Materials Considered

Legal Documents

Annex 1 to Modified Second Amended Title III Plan of Adjustment of the Puerto Rico Electric Power Authority Schedule B, *In re: The Financial Oversight and Management Board for Puerto Rico, as a representative of the Commonwealth of Puerto Rico, et al., Debtors* , PROMESA Title III No. 17-BK-3283-LTS, and *In re: The Financial Oversight and Management Board for Puerto Rico, as a representative of Puerto Rico Electric Power Authority, Debtor* , PROMESA Title III No. 17-BK-4780-LTS (Jointly Administered), United States District Court for the District of Puerto Rico, San Juan, Puerto Rico, March 1, 2023.

"Revenue Envelope and Legacy Charge Derivation Workbook," received March 11, 2023.

Disclosure Statement Exhibit A: Modified Second Amended Title III Plan of Adjustment of the Puerto Rico Electric Power Authority.

Disclosure Statement Exhibit H: Summary of Outstanding PREPA Bonds.

Disclosure Statement Exhibit O: Estimation of General Unsecured Claims Pool.

Disclosure Statement Exhibit P: Legacy Charge Derivation.

Disclosure Statement for Modified Second Amended Title III Plan of Adjustment of the Puerto Rico Electric Power Authority, *In re: The Financial Oversight and Management Board for Puerto Rico, as a representative of the Commonwealth of Puerto Rico, et al., Debtors* , PROMESA Title III No. 17-BK-3283-LTS, and *In re: The Financial Oversight and Management Board for Puerto Rico, as a representative of Puerto Rico Electric Power Authority, Debtor* , PROMESA Title III No. 17-BK-4780-LTS (Jointly Administered), United States District Court for the District of Puerto Rico, San Juan, Puerto Rico, March 1, 2023.

Disclosure Statement Hearing, *In re: The Financial Oversight and Management Board for Puerto Rico, as a representative of the Commonwealth of Puerto Rico, et al., Debtors* , PROMESA Title III No. 17-BK-3283-LTS, and *In re: The Financial Oversight and Management Board for Puerto Rico, as a representative of Puerto Rico Electric Power Authority, Debtor* , PROMESA Title III No. 17-BK-4780-LTS (Jointly Administered), United States District Court for the District of Puerto Rico, San Juan, Puerto Rico, February 28, 2023.

Expert Reports

Expert Report of Susan Tierney, PhD., April 28, 2023, and associated Exhibits and Backup Materials.

Expert Report of Sebastian Edwards, April 28, 2023, and associated Exhibits and Backup Materials.

Bates-Stamped Documents

"kWh Consumption.xlsx," FOMB_PREPA 00022591.

"2022 Certified Fiscal Plan for the Puerto Rico Electric Power Authority," June 28, 2022, FOMB_PREPA 00000699 –

"January 2022 Fiscal Plan Model Certified (Dataroom).xlsx," FOMB_PREPA00020359.

Luma Consumption Data ("1.4_Commercial, Industrial and Government.xlsx"), FOMB_PREPA 00001475.

Academic Literature

Winkler, Harry et al., "Access and Affordability of Electricity in Developing Countries," World Development 39, no. 6 (2011) 1037–1050.

Borenstein, Severin and Lucas W. Davis, "The Equity and Efficiency of Two-Part Tariffs in U.S. Natural Gas Markets," *The Journal of Law & Economics* 55, no. 1 (February 2012) 75–128.

Brown, Marilyn, et al., "High Energy Burden and Low-Income Energy Affordability: Conclusions from a Literature Review," *Progress in Energy* 2, (2022): 1–35, October 27, 2020.

Burke, Paul J. and Ashani Abayasekara, "The Price Elasticity of Electricity Demand in the United States: A Three-Dimensional Analysis," *The Energy Journal* 39, no. 2 (2018): 126−46.

Colton, Roger D. "Home Energy Affordability in New York: The Affordability Gap (2008–2010)," Working Paper (2011), https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/EDPPP/LIFE/Resources/2008-2010-affordability-gap.pdf.

Deller, David, "Energy Affordability in the EU: The Risks of Metric Driven Policies," December 12, 2017.

APPENDIX C

Materials Considered

Academic Literature

Elgin, C. et al., "Understanding Informality," Centre for Economic Policy Research, 2021, C.E.P.R. Discussion Paper 16497.

Hernandez, Diana et al., "Housing Hardship and Energy Insecurity Among Native-Born and Immigrant Low-Income Families with Children in the United States," *Journal of Child Poverty* 22, no. 2 (2016): 77–92.

Hubbard, Glenn, and Anthony Patrick O'Brien, "Microeconomics, Seventh Edition," (New York, NY: Pearson, 2019).

Linneman, Peter D. and Isaac F. Megbolugbe, "Housing Affordability: Myth or Reality?" *Urban Studies* 29, nos. 3/4 (1992): 369–92.

Miniaci, Raffaele et al., "Energy affordability and the benefits system in Italy," *Energy Policy* , (2014).

Ramcharran, Harri, "The Pharmaceutical Industry of Puerto Rico: Ramifications of Global Competition," *Journal of Policy Modeling* 33, (2011): 395–406.

Schwartz, Mary and Ellen Wilson, "Who Can Afford To Live in a Home?: A Look at Data From the 2006 American Community Survey," Unpublished Working Paper (2008), https://acash.org.pk/wp-content/uploads/2018/09/who-can-afford.pdf.

Stone, Michael E., "What is Housing Affordability? The Case for the Residual Income Approach," *Housing Policy Debate* , 17:1 (2006) 151–184.

Winkler, Harry et al., "Access and Affordability of Electricity in Developing Countries," *World Development* 39, no. 6 (2011) 1037–1050.

Zhu, Xing et al., "A meta-analysis on the price elasticity and income elasticity of residential electricity demand," *Journal of Cleaner Production,* no. 201, (2018): 169-177.

Other Publicly Available Sources

Banco de Desarrollo Economico Para Puerto Rico, "Puerto Rico Economic Data," https://www.bde.pr.gov/BDE/PRED.html.

Becker, Randy A. et al., "NBER-CES Manufacturing Industry Database (1958-2018, version 2021a)," National Bureau of Economic Research, 2021, https://www.nber.org/research/data/nber-ces-manufacturing-industry-database.

Bond, Craig A. et al., "Challenges and Opportunities for the Puerto Rico Economy: A Review of Evidence and Options Following Hurricanes Irma and Maria in 2017," Rand Corporation, 2020, https://www.rand.org/pubs/research_reports/RR2600.html.

Commonwealth of Puerto Rico Office of the Governor Planning Board, "Statistical Appendix of the Economic Report to the Governor and to the Legislative Assembly," 2021.

Drehobl, Ariel et al., "How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy

Financial Oversight & Management Board for Puerto Rico, "2022 Fiscal Plan for Puerto Rico," January 27, 2022,

Herbert, Christopher, et al., "Measuring Housing Affordability: Assessing the 30 Percent of Income Standard," Joint Center for Housing Studies of Harvard University, September 2018, https://www.jchs.harvard.edu/sites/default/files/media/imp/Harvard_JCHS_Herbert_Hermann_McCue_measuring_housing_affordability.pdf

Hills, John, "Getting the measure of fuel poverty: final report of the Fuel Poverty Review," Centre for Analysis of Social Exclusion, May 2012.

Invest Puerto Rico, "Benchmarking Puerto Rico's Pharma Sector: An Analysis of the Island's Sector Competitiveness and Recommendations for Driving Economic Transformation," July 1, 2021, https://www.investpr.org/wp-content/uploads/2022/02/Benchmarking-PuertoRicos-Pharma-Sector-PIA-InvestPR.pdf.

IPUMS, 2019 American Community Survey, https://usa.ipums.org/usa/index.shtml.

IPUMS, 2019 Puerto Rico Community Survey, https://usa.ipums.org/usa/index.shtml.

IPUMS, 2021 Puerto Rico Community Survey, https://usa.ipums.org/usa/index.shtml.

Ma, Ookie et al., "Low-Income Energy Affordability Data (LEAD) Tool Methodology," National Renewable Energy Laboratory, July 2019.

Pelletiere, Danilo, "Getting to the Heart of Housing's Fundamental Question: How Much Can a Family Afford," National Low Income Housing Coalition, February 2008, https://nlihc.org/sites/default/files/affordabilityresearchnote2-19-08.pdf.

APPENDIX C

Materials Considered

Other Publicly Available Sources

Puerto Rico Electric Power Authority, “Electric Service rates and Riders,” available at: https://lumapr.com/wp-content/uploads/2023/02/Tariff-Book-Electric-Service-Rates-and-Riders-Revised-by-Order-05172019-Approved-by-Order-05282019.pdf.

Schwartz, Mary and Ellen Wilson, “Who Can Afford to Live in a Home? A look at data from the 2006 American Community Survey,” 2007.

Siemens Industry, “Puerto Rico Integrated Resource Plan 2018 - 2019,” June 7, 2019.

Thema, Johannes and Floring Vondung, “EU Energy Poverty Observatory: EPOV Indicator Dashboard Methodology Guidebook,” EU Energy Poverty Observatory, May 2020.

Trinomics, “Selecting Indicators to Measure Energy Poverty,” May 18, 2016.

U.S. Bureau of Economic Analysis, "The Domestic Supply of Commodities by Industries - Summary" https://apps.bea.gov/iTable/?reqid=150&step=3&isuri=1&table_list=6006&categories=io

U.S. Bureau of Labor Statistics, “Occupational Employment and Wage Statistics,” July 19, 2022, https://www.bls.gov/oes/tables.htm.

U.S. Census Bureau. (n.d.). *US Census Bureau “Island Areas: Cost of Materials by Manufacturing Industry for Puerto Rico: 2017”* . Retrieved April 28, 2023, from https://data.census.gov/

U.S. Department of Housing and Urban Development, “Comprehensive Housing Market Analysis Puerto Rico,” July 2019, https://www.huduser.gov/portal/publications/pdf/CMARtables_PuertoRico_19.pdf.

U.S. Energy Information Administration, “Electricity”, available at: https://www.eia.gov/electricity/data.php

U.S. Energy Information Administration, “Puerto Rico Territory Energy Profile,” last updated January 19, 2023, https://www.eia.gov/state/print.php?sid=RQ#.

UK Department for Business, Energy & Industrial Strategy, “Fuel Poverty Methodology Handbook (Low Income High Costs),” April 30, 2020.

UK Department for Business, Energy & Industrial Strategy, “Fuel Poverty Methodology Handbook (Low Income High Energy Efficiency),” February 24, 2022.

EXHIBIT 1
THE BOARD'S FIXED AND VOLUMETRIC CHARGES ARE SET BASED ON THE MONTHLY ELECTRICITY BILL OF THE HYPOTHETICAL RESIDENTIAL CUSTOMER THAT DOES NOT EXCEED 6% OF THE HYPOTHETICAL RESIDENTIAL CUSTOMER'S 2024 MONTHLY INCOME

(a) Expected Charges using 2022 Fiscal Plan Base Rates

Fixed Rate	\$4.0000
Volumetric Charge ($\leq$ 425 kWh)	\$0.0494
Volumetric Charge (> 425 kWh)	\$0.0556
Fuel & Purchased Power (\$/kWh)	\$0.1224
CILT (\$/kWh)	\$0.0071
Subsidies (\$/kWh)	\$0.0155
ERS Pension Projections (\$/kWh)	\$0.0240
Total Bill (No Debt Repayment)	\$96.8124

(b) Revenue Envelope Charges

Incremental Fixed Rate	\$21.0000
Incremental Volumetric Charge ($\leq$ 500 kWh)	\$0.0075
Incremental Volumetric Charge (> 500 kWh)	\$0.0300
Bill Impact of Revenue Envelope Charges	\$24.1875

(c) Results

Total Fixed Rate	\$25.0000
Total Volumetric Charges	\$95.9999
Total Monthly Bill	\$120.9999
Resulting Percent of Income	6%

Source: Revenue Envelope and Legacy Charge Derivation Workbook.

EXHIBIT 2
REVENUE ENVELOPE FIXED RATES BY CUSTOMER CLASS

	2024 Base Fixed Rate From 2022 Fiscal Plan	Additional Fixed Rate From Revenue Envelope
(a) Residential Customer Classes		
RH3, LRS, RFR	$2.00	$0.00
GRS 111	$4.00	$21.00
GRS 112 (LC Subsidy eligible)	$4.00	$0.00
GRS 112 (General)	$4.00	$21.00
(b) Commercial Customer Classes		
GSS 211	$5.00	$26.25
GSP 212	$200.00	$1,050.00
GST 213	$450.00	$2,362.50
(c) Government Customer Classes		
GSS 211	$5.00	$26.25
GSP 212	$200.00	$1,050.00
GST 213	$450.00	$2,362.50
(d) Municipalities Customer Classes		
GSS 211	$5.00	$26.25
GSP 212	$200.00	$1,050.00
GST 213	$450.00	$2,362.50
(e) Industrial Customer Classes		
GSS 311	$5.00	$26.25
GSP 312	$200.00	$1,050.00
GST 313	$450.00	$2,362.50
TOU-T 363	$450.00	$2,362.50
LIS 333	$450.00	$2,362.50
TOU-T 963	$450.00	$2,362.50

EXHIBIT 2
REVENUE ENVELOPE FIXED RATES BY CUSTOMER CLASS

Notes:

[1] Base Fixed Rates are from the 2022 PREPA Fiscal Plan.

[2] The Residential PREPA rate classes are defined as follows: General Residential Servise (GRS) rates apply to to residential customers for domestic uses for a residence or apartment unless they fit into one of the following classes. GRS rates may also apply to houses, apartments, and other structures which are primarily intended for residential purposes, where no more than two rooms in which the total connected load does not exceed 500 watts are used by tenant for business or professional purposes. Lifeline Residential Service (LRS) rates apply to residential customers, who fulfill the Nutritional Assistance Program criteria, for all domestic uses for a residence or apartment. Residential Service for Public Housing Projects (RH3) rates apply to residential customers of Public Housing Projects supported or subsidized in whole or in part by loans, grants, contributions or appropriations of the federal, state, or municipal governments. Residential Fixed Rate for Public Housing Under Ownership of the Public Housing Administration (RFR) rates apply to customers residing in a housing unit physically located within a public housing project owned by the Public Housing Administration for all domestic uses.

[3] The Non-Residential PREPA rate classes are defined as follows: General Service at Secondary Distribution Voltage (GSS) rates apply to any non-residential service with a load lower than 50kVA. They also apply to temporary electric power service for limited use in streets, carnivals, and others. General Service at Primary Distribution Voltage (GSP) rates apply to industrial customers and commercial customers for which service is rendered through a single point of connection and a single meter. General Service at Transmission Voltage (GST) rates apply to commercial and industrial customers connected to the transmission system that have a demand of 250 kVA or greater, for general uses, e.g., motive power, heating, refrigeration, and incidental lighting of industries, hotels, and any other establishment. Time of Use at Transmission Voltage (TOU-T) rates apply to commercial and industrial customers with a demand of 1,000 kVA or greater that (i) transfer load from the on-peak period to the off-peak period; (2) add load during the off-peak period; and (3) remove load from the on-peak period. Large Industrial Service -115 kV (LIS) rates apply exclusively for industries with a demand equal to 12,000 kW or higher, with a load factor equal to 80% or higher, and a monthly average power factor equal to 95% or higher.

Sources:

[1] Revenue Envelope and Legacy Charge Derivation Workbook.
[2] Disclosure Statement.

EXHIBIT 3
REVENUE ENVELOPE ADDITIONAL VOLUMETRIC RATES

	Load ≤ 500 kWh		Load > 500 kWh	
	Volumetric Charge Adjustment Factor	Incremental Volumetric Charge	Volumetric Charge Adjustment Factor	Incremental Volumetric Charge
(a) Residential Customer Classes				
RH3, LRS, RFR	0%	$0.0000	50%	$0.0150
GRS 111	25%	$0.0075	100%	$0.0300
GRS 112 (LC Subsidy eligible)	0%	$0.0000	50%	$0.0150
GRS 112 (General)	25%	$0.0075	---	$0.0300
(b) Commercial Customer Classes				
GSS 211	50%	$0.0150	100%	$0.0300
GSP 212	50%	$0.0150	50%	$0.0150
GST 213	33%	$0.0100	33%	$0.0100
(c) Government Customer Classes				
GSS 211	50%	$0.0150	100%	$0.0300
GSP 212	50%	$0.0150	50%	$0.0150
GST 213	33%	$0.0100	33%	$0.0100
(d) Municipalities Customer Classes				
GSS 211	50%	$0.0150	100%	$0.0300
GSP 212	50%	$0.0150	50%	$0.0150
GST 213	33%	$0.0100	33%	$0.0100
(e) Industrial Customer Classes				
GSS 311	75%	$0.0225	75%	$0.0225
GSP 312	75%	$0.0225	75%	$0.0225
GST 313	50%	$0.0150	50%	$0.0150
TOU-T 363	50%	$0.0150	50%	$0.0150
LIS 333	50%	$0.0150	50%	$0.0150
TOU-T 963	50%	$0.0150	50%	$0.0150

EXHIBIT 3
REVENUE ENVELOPE ADDITIONAL VOLUMETRIC RATES

Notes:

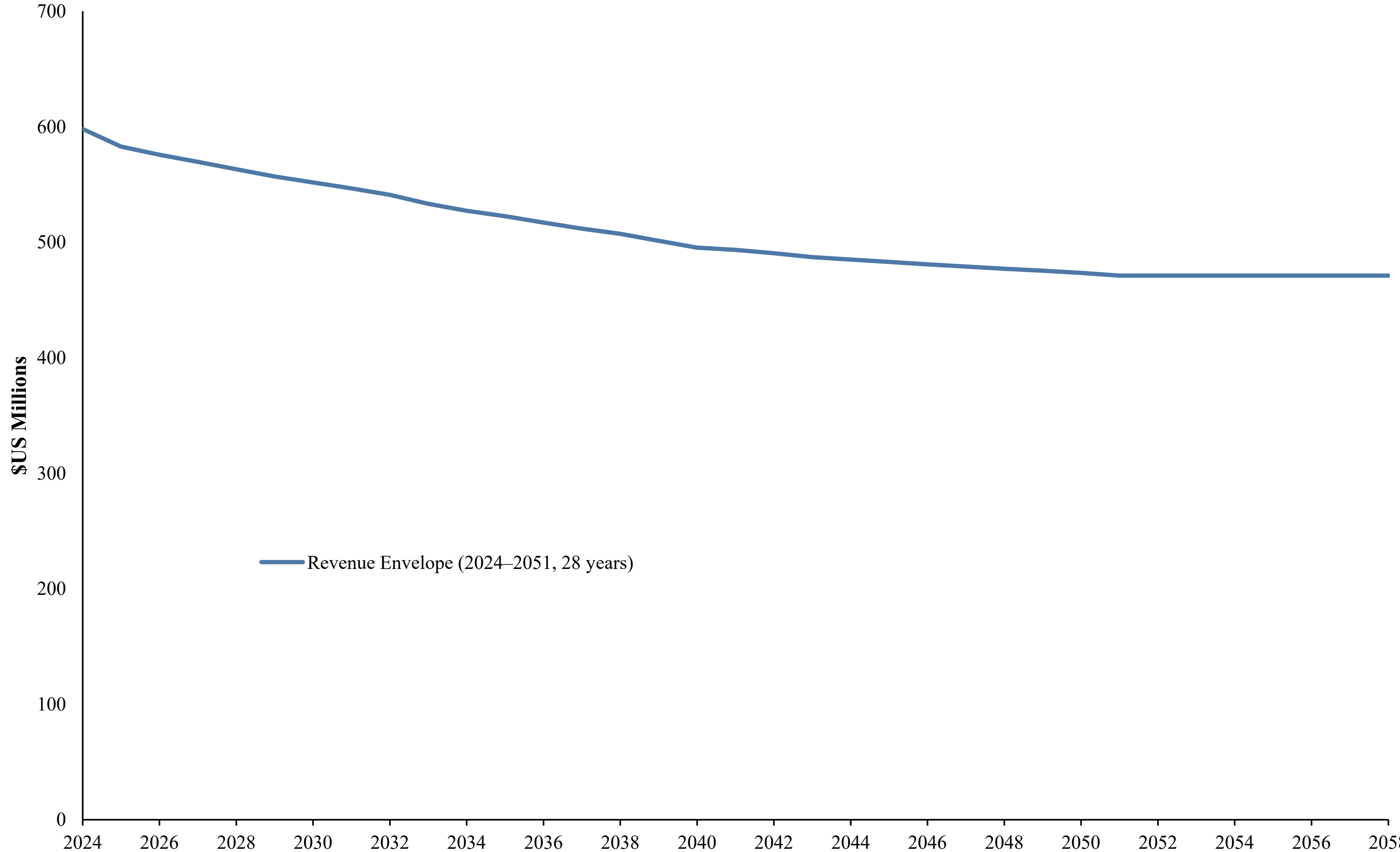
[1] The Residential PREPA rate classes are defined as follows: General Residential Servise (GRS) rates apply to to residential customers for domestic uses for a residence or apartment unless they fit into one of the following classes. GRS rates may also apply to houses, apartments, and other structures which are primarily intended for residential purposes, where no more than two rooms in which the total connected load does not exceed 500 watts are used by tenant for business or professional purposes. Lifeline Residential Service (LRS) rates apply to residential customers, who fulfill the Nutritional Assistance Program criteria, for all domestic uses for a residence or apartment. Residential Service for Public Housing Projects (RH3) rates apply to residential customers of Public Housing Projects supported or subsidized in whole or in part by loans, grants, contributions or appropriations of the federal, state, or municipal governments. Residential Fixed Rate for Public Housing Under Ownership of the Public Housing Administration (RFR) rates apply to customers residing in a housing unit physically located within a public housing project owned by the Public Housing Administration for all domestic uses.

[2] The Non-Residential PREPA rate classes are defined as follows: General Service at Secondary Distribution Voltage (GSS) rates apply to any non-residential service with a load lower than 50kVA. They also apply to temporary electric power service for limited use in streets, carnivals, and others. General Service at Primary Distribution Voltage (GSP) rates apply to industrial customers and commercial customers for which service is rendered through a single point of connection and a single meter. General Service at Transmission Voltage (GST) rates apply to commercial and industrial customers connected to the transmission system that have a demand of 250 kVA or greater, for general uses, e.g., motive power, heating, refrigeration, and incidental lighting of industries, hotels, and any other establishment. Time of Use at Transmission Voltage (TOU-T) rates apply to commercial and industrial customers with a demand of 1,000 kVA or greater that (i) transfer load from the on-peak period to the off-peak period; (2) add load during the off-peak period; and (3) remove load from the on-peak period. Large Industrial Service -115 kV (LIS) rates apply exclusively for industries with a demand equal to 12,000 kW or higher, with a load factor equal to 80% or higher, and a monthly average power factor equal to 95% or higher.

Sources:

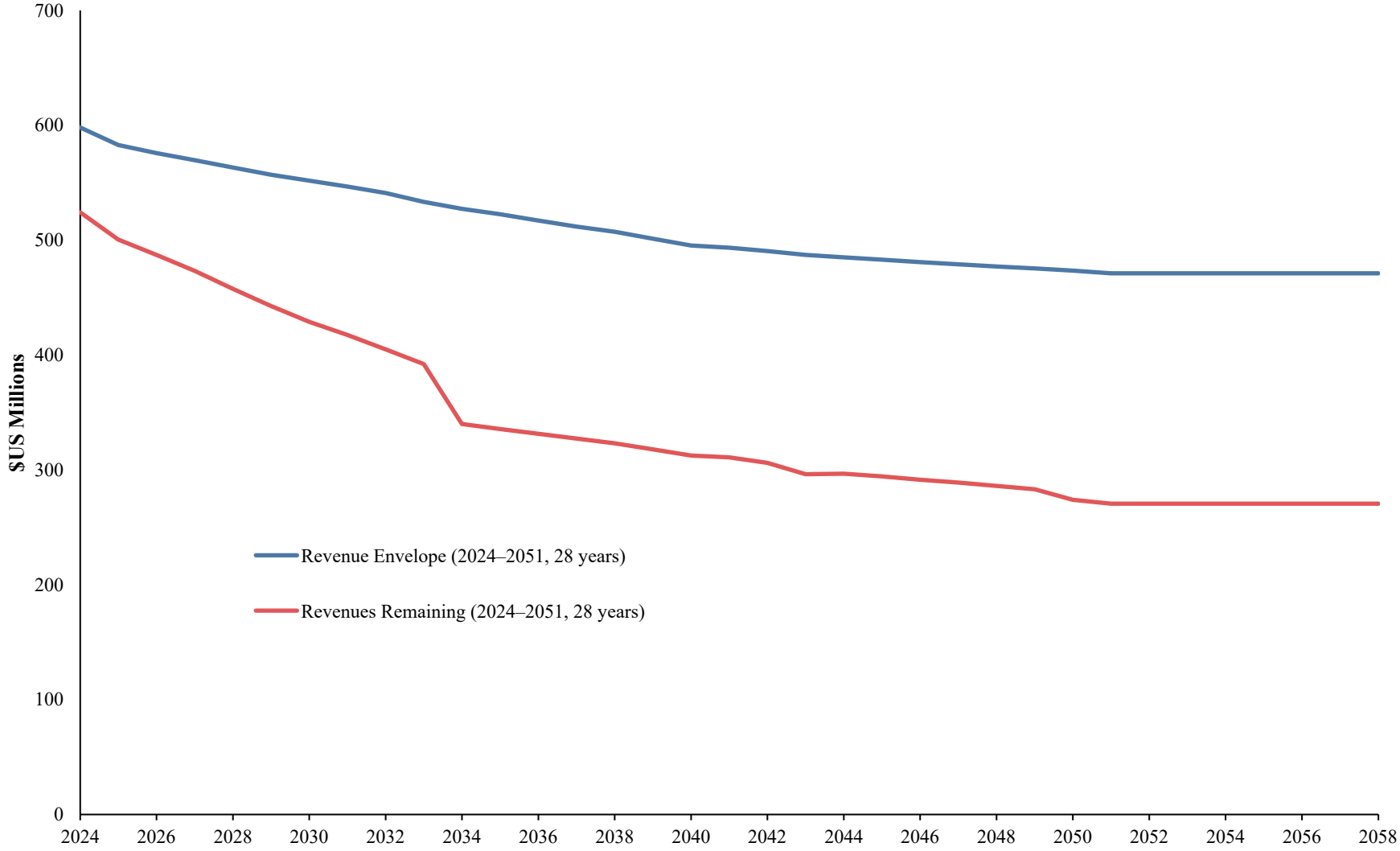
[1] Revenue Envelope and Legacy Charge Derivation Workbook.
[2] Disclosure Statement.

EXHIBIT 4
REVENUE ENVELOPE OVER TIME
2024–2058



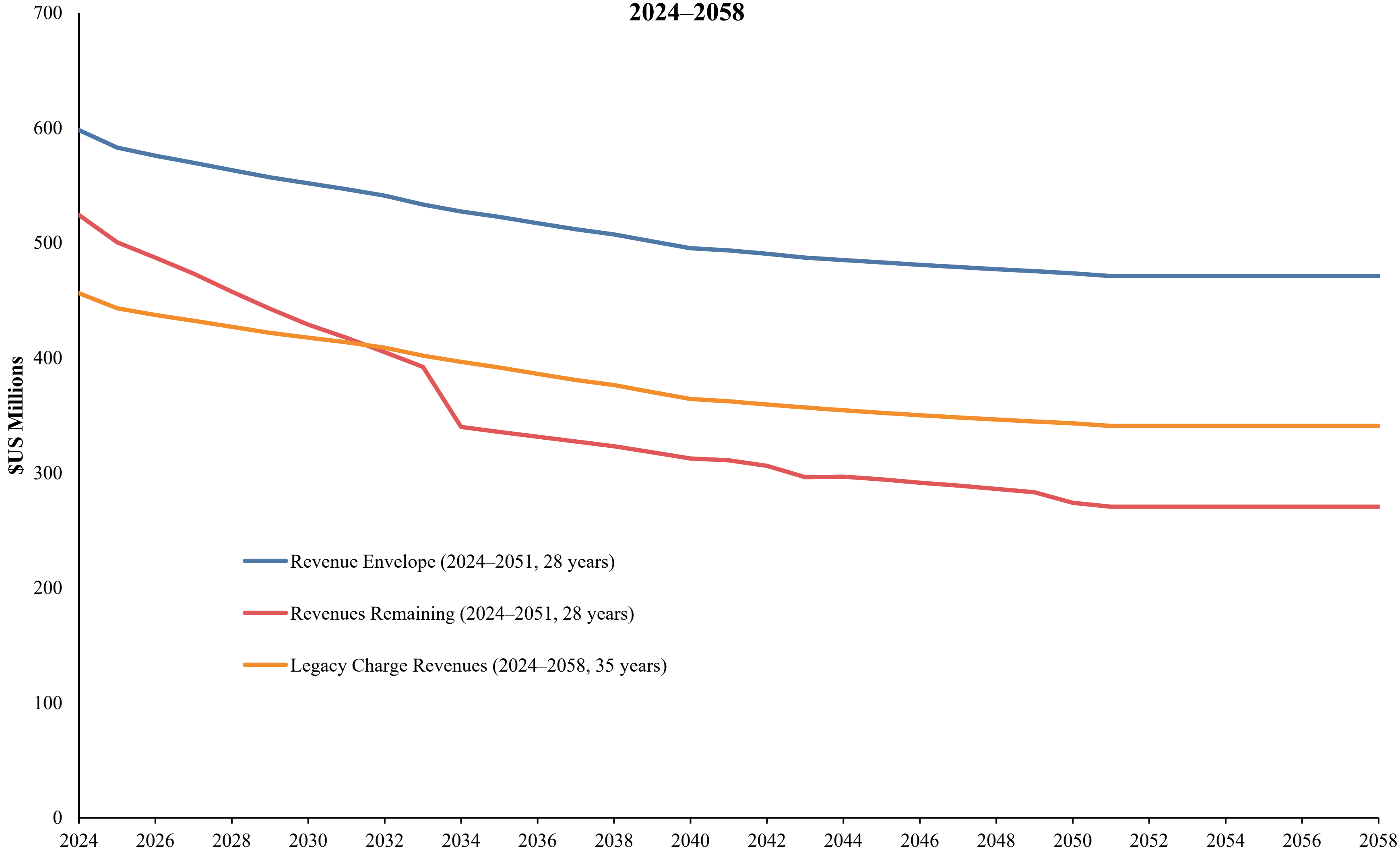
Source: Revenue Envelope and Legacy Charge Derivation Workbook.

EXHIBIT 5
REVENUE ENVELOPE AND REVENUES REMAINING OVER TIME
2024–2058



Source: Revenue Envelope and Legacy Charge Derivation Workbook.

EXHIBIT 6
REVENUE ENVELOPE, REVENUES REMAINING AND LEGACY CHARGE REVENUES OVER TIME
2024–2058



Source: Revenue Envelope and Legacy Charge Derivation Workbook.

EXHIBIT 7
THE BOARD'S LEGACY CHARGE FIXED AND VOLUMETRIC RATES

				Load ≤ 500 kWh		Load > 500 kWh	
	2024 Base Fixed Rate From 2022 Fiscal Plan	Fixed Rate Multiplier	Additional Fixed Rate	Volumetric Rate Adjustment Factor	Additional Volumetric Rate	Volumetric Rate Adjustment Factor	Additional Volumetric Rate
(a) Residential							
RH3, LRS, RFR	$2.00		$0.00	0%	$0.0000	50%	$0.0150
GRS 111	$4.00	3.25	$13.00	25%	$0.0075	100%	$0.0300
GRS 112 (LC Subsidy eligible)	$4.00		$0.00	0%	$0.0000	50%	$0.0150
GRS 112 (General)	$4.00	3.25	$13.00	25%	$0.0075	100%	$0.0300
(b) Commercial							
GSS 211	$5.00	3.25	$16.25	50%	$0.0150	100%	$0.0300
GSP 212	$200.00	4	$800.00	50%	$0.0145	50%	$0.0145
GST 213	$450.00	4	$1,800.00	33%	$0.0097	33%	$0.0097
(c) Government							
GSS 211	$5.00	4	$20.00	50%	$0.0145	100%	$0.0290
GSP 212	$200.00	4	$800.00	50%	$0.0145	50%	$0.0145
GST 213	$450.00	4	$1,800.00	33%	$0.0097	33%	$0.0097
(d) Industrial							
GSS 311	$5.00	4	$20.00	75%	$0.0218	75%	$0.0218
GSP 312	$200.00	4	$800.00	75%	$0.0218	75%	$0.0218
GST 313	$450.00	4	$1,800.00	50%	$0.0145	50%	$0.0145
TOU-T 363	$450.00	4	$1,800.00	50%	$0.0145	50%	$0.0145
LIS 333	$450.00	4	$1,800.00	50%	$0.0145	50%	$0.0145
TOU-T 963	$450.00	4	$1,800.00	50%	$0.0145	50%	$0.0145

EXHIBIT 7
THE BOARD'S LEGACY CHARGE FIXED AND VOLUMETRIC RATES

Notes:

[1] Base Fixed Rates are from the 2022 PREPA Fiscal Plan.

[2] The Residential PREPA rate classes are defined as follows: General Residential Servise (GRS) rates apply to to residential customers for domestic uses for a residence or apartment unless they fit into one of the following classes. GRS rates may also apply to houses, apartments, and other structures which are primarily intended for residential purposes, where no more than two rooms in which the total connected load does not exceed 500 watts are used by tenant for business or professional purposes. Lifeline Residential Service (LRS) rates apply to residential customers, who fulfill the Nutritional Assistance Program criteria, for all domestic uses for a residence or apartment. Residential Service for Public Housing Projects (RH3) rates apply to residential customers of Public Housing Projects supported or subsidized in whole or in part by loans, grants, contributions or appropriations of the federal, state, or municipal governments. Residential Fixed Rate for Public Housing Under Ownership of the Public Housing Administration (RFR) rates apply to customers residing in a housing unit physically located within a public housing project owned by the Public Housing Administration for all domestic uses.

[3] The Non-Residential PREPA rate classes are defined as follows: General Service at Secondary Distribution Voltage (GSS) rates apply to any non-residential service with a load lower than 50kVA. They also apply to temporary electric power service for limited use in streets, carnivals, and others. General Service at Primary Distribution Voltage (GSP) rates apply to industrial customers and commercial customers for which service is rendered through a single point of connection and a single meter. General Service at Transmission Voltage (GST) rates apply to commercial and industrial customers connected to the transmission system that have a demand of 250 kVA or greater, for general uses, e.g., motive power, heating, refrigeration, and incidental lighting of industries, hotels, and any other establishment. Time of Use at Transmission Voltage (TOU-T) rates apply to commercial and industrial customers with a demand of 1,000 kVA or greater that (i) transfer load from the on-peak period to the off-peak period; (2) add load during the off-peak period; and (3) remove load from the on-peak period. Large Industrial Service -115 kV (LIS) rates apply exclusively for industries with a demand equal to 12,000 kW or higher, with a load factor equal to 80% or higher, and a monthly average power factor equal to 95% or higher.

Sources:

[1] Revenue Envelope and Legacy Charge Derivation Workbook.

[2] Disclosure Statement.

EXHIBIT 8
MEDIAN MONTHLY HOUSEHOLD LOAD CALCULATED FROM PUERTO RICO COMMUNITY SURVEY BY INCOME BAND

Income Band	[A] Monthly Bill	[B] Load Based on FY 2021 Rate [A] / $0.1876/kWh	[C] Load Based on FY 2022 Rate [A] / $0.2464kWh	[D] Load Based on EIA 2021 Rate [A] / $0.2116/kWh	[E] Load Based on Average of FYs 2021 and 2022 Rates [A] / $0.2170/kWh
<$10k	$50	266 kWh	203 kWh	236 kWh	230 kWh
$10k-20k	$70	373 kWh	284 kWh	331 kWh	323 kWh
$20k-30k	$80	426 kWh	325 kWh	378 kWh	369 kWh
$30k-40k	$90	480 kWh	365 kWh	425 kWh	415 kWh
$40k-50k	$100	533 kWh	406 kWh	473 kWh	461 kWh
$50k-60k	$120	640 kWh	487 kWh	567 kWh	553 kWh
$60k-70k	$120	640 kWh	487 kWh	567 kWh	553 kWh
$70k-80k	$150	799 kWh	609 kWh	709 kWh	691 kWh
$80k-90k	$140	746 kWh	568 kWh	662 kWh	645 kWh
$90k-100k	$150	799 kWh	609 kWh	709 kWh	691 kWh
$100k+	$170	906 kWh	690 kWh	803 kWh	783 kWh
No income bands (Board's Calculation)	$80	426 kWh	325 kWh	378 kWh	369 kWh

Notes:

[1] The (Fiscal Year) FY 2021 Rate and FY 2022 Rate refer to rates for Residential customers from the 2022 Fiscal Plan Financial Model. They are $0.1876/kWh and $0.2464/kWh, respectively.

[2] Energy Information Administration (EIA) 2021 Rate is the average price of electricity for the ultimate residential customer: $0.2116/kWh.

Sources:

[1] 2022 PREPA Fiscal Plan.

[2] U.S. Energy Information Administration. 2023. "Puerto Rico Territory Profile." https://www.eia.gov/state/print.php?sid=RQ#.

[3] 2021 Puerto Rico Community Survey.

EXHIBIT 9
CALCULATION OF 2024 ELECTRICITY CONSUMPTION BASED ON 2021 ELECTRICITY CONSUMPTION

Data and Methods	[A] Median Monthly Electricity Consumption in 2021	[B] Median Monthly Electricity Consumption in 2024 Using Board's Methodology
(a) 2021 Puerto Rico Community Survey Data		
Board's median consumption calculation using Fiscal Year 2021 Rates	426 kWh	430 kWh
Calculation using average of Fiscal Year 2021 and Fiscal Year 2022 rates	369 kWh	372 kWh
Calculation using Energy Information Administration 2021 electricity rate	378 kWh	382 kWh
(b) 2021 Luma Electricity Consumption Data for Residential GRS 112 Customers		
Calculation using full dataset	356 kWh	359 kWh
Calculation excluding customers with 0 kWh monthly consumption	386 kWh	389 kWh

Notes:

[1] I calculate median load in 2024 using the Board's methodolgy. The Board infers median consumption in 2024 by assuming median consumption changes year to year by the same percentages as year-to-year changes in average (forecasted) electricity consumption.

Sources:

[1] 2022 PREPA Fiscal Plan.
[2] U.S. Energy Information Administration. 2023. "Puerto Rico Territory Profile." https://www.eia.gov/state/print.php?sid=RQ#.
[3] Board Income Extrapolation Workbook ("kWh Consumption.xlsx").
[4] LUMA Consumption Data

EXHIBIT 10
"ADDITIONAL NET REVENUES" USING MORE REPRESENTATIVE CONSUMPTION ASSUMPTIONS FOR THE HYPOTHETICAL RESIDENTIAL CUSTOMER

Scenarios	"Additional Net Revenues" ($ Billion)
Board's Proposal:	
Hypothetical Residential Customer Consumption 425 kWh	$5.68
More Representative Assumptions on Consumption of Hypothetical Residential Customer	
400 kWh	$7.19
372 kWh	$8.96

Notes:

[1] The Plan of Adjustment and Disclosure Statement describe a proposal to restructure PREPA's debt principally through an issuance of $5.68 billion of New Bonds to fund partial recoveries on creditors' claims.

[2] The scenarios with monthly consumption of 400 kWh and 372 kWh adjust monthly consumption in the affordability calculation. In these scenarios, I apportion the incremental amount charged in the Revenue Envelope between fixed and volumetric rates using the same ratio assumed in the Board's affordability calculations. The remaining calculations to arrive at "Additional Net Revenues" are performed using the same methodology as the Board.

Sources:

[1] Revenue Envelope and Legacy Charge Derivation Workbook.
[2] Puerto Rico Community Survey.
[3] Disclosure Statement.

EXHIBIT 11
"ADDITIONAL NET REVENUES" ADJUSTING THE HYPOTHETICAL RESIDENTIAL CUSTOMER'S INCOME FOR INFLATION OVER TIME

Scenarios	**"Additional Net Revenues" ($ Billion)**
Board's Proposal: $24,000 Nominal Income, 2024–2058	$5.68
Adjust Nominal Income for Inflation Growth, 2024–2058	$6.57

Notes:

[1] The Plan of Adjustment and Disclosure Statement describe a proposal to restructure PREPA's debt principally through an issuance of $5.68 billion of New Bonds to fund partial recoveries on creditors' claims.

[2] The nominal income growth scenario grows the Hypothetical Residential Customer's $24,000 income for inflation using inflation projections over 2024–2058 from the 2022 PREPA Fiscal Plan. I repeat the Board's affordability methodology each year using this income series and projected revenue requirement rates from the 2022 PREPA Fiscal Plan. In keeping with the Board's calculations, to estimate the monthly bill I use tariff schedule rates and fiscal plan projected rates. The remaining calculations to arrive at "Additional Net Revenues" are performed using the same methodology as the Board.

Sources:

[1] Revenue Envelope and Legacy Charge Derivation Workbook.

[2] 2022 PREPA Fiscal Plan.

[3] Disclosure Statement.

EXHIBIT 12
SHARE OF WALLET OF MONTHLY ELECTRICITY BILL INCLUDING LEGACY CHARGE

Annual Income Band	**[A]** **Median Monthly Electricity Consumption in 2024 Extrapolated from 2021 Based on Board's Methodology**	**[B]** **Monthly Electricity Bill Calculated by Applying 2024 Base Rates from 2022 Fiscal Plan to 2024 Median Consumption**	**[C]** **Monthly Electricity Bill Including Legacy Charge**	**[D]** **Electricity Bill Including Legacy Charge Share of Wallet = ([C] / Monthly Income)**
Hypothetical Residential Customer	425 kWh	$96.81	$113.00	5.6%
$20k-30k	430 kWh	$98.00	$114.22	5.5%
$30k-40k	484 kWh	$110.08	$126.71	4.3%
$40k-50k	538 kWh	$122.16	$140.04	3.7%
$50k-60k	645 kWh	$146.31	$167.43	3.7%
$60k-70k	645 kWh	$146.31	$167.43	3.1%
$70k-80k	807 kWh	$182.55	$208.50	3.3%
$80k-90k	753 kWh	$170.47	$194.81	2.8%
$90k-100k	807 kWh	$182.55	$208.50	2.6%

Notes:

[1] Median monthly consumption in 2021 was extrapolated to 2024 based on the Board's methodolgy. The Board extrapolates the 2021 load to 2024 by using the same percent change in the average annual load(adjusted for lighting savings) per customer between the two years. The lighting savings adjusted gross load and the number of customers are taken from the 2022 PREPA Fiscal Plan.

[2] The midpoint of each income band was used as the representative income. For the Hypothetical Residential Customer, $24,000 was used for annual household income. Annual income's were divided by 12 to arrive at monthly income.

[3] Fixed and volumetric base rates and Legacy Charge rates were taken from the Board's Revenue Envelope and Legacy Charge Workbook.

[4] Fiscal Year (FY) electricity rates were taken from the 2022 PREPA Fiscal Plan.

Sources:

[1] 2022 PREPA Fiscal Plan.

[2] Revenue Envelope and Legacy Charge Workbook.

[3] Board Consumption Extrapolation Workbook ("kWh Consumption.xlsx").

[4] 2021 Puerto Rico Community Survey.

[5] U.S. Energy Information Administration. 2023. "Puerto Rico Territory Profile." https://www.eia.gov/state/print.php?sid=RQ#.

EXHIBIT 13
"ADDITIONAL NET REVENUES" ADJUSTING THE PROPORTION OF REVENUE ENVELOPE COLLECTED THROUGH FIXED VS. VOLUMETRIC RATES

Scenarios	"Additional Net Revenues" ($ Billion)
Board's Proposal: 87% of Hypothetical Customer's Revenue Envelope Collected Through Fixed Charges	$5.68
Fixed Proportion of Hypothetical Customer's Revenue Envelope Rates	
80%	$5.75
75%	$5.80

Notes:

[1] The Plan of Adjustment and Disclosure Statement describe a proposal to restructure PREPA's debt principally through an issuance of $5.68 billion of New Bonds to fund partial recoveries on creditors' claims.

[2] The Board asserts that the Revenue Envelope uses the the affordable rate combination that yields the greatest increase in revenue collection. The scenarios vary the proportion of the Board's Revenue Envelope rates for the hypothetical customer collected through volumetric rates instead of fixed rates. The Board assumes approximately 87% fixed; I consider lower fixed proportions. The remaining calculations to arrive at "Additional Net Revenues" are performed using the same methodology as the Board.

Sources:

[1] Revenue Envelope and Legacy Charge Derivation Workbook.

[2] Disclosure Statement.

EXHIBIT 14
ELECTRICITY BILL FOR NON-RESIDENTIAL CUSTOMERS: BASE, REVENUE ENVELOPE, AND LEGACY CHARGE RATES

			Median Monthly Electricity Bill as of 2024			Percent Difference	
	2021 Median Monthly Consumption (kWh)	Estimated 2024 Median Monthly Consumption (kWh)	[A] 2024 Base Rates from 2022 Fiscal Plan Applied to 2024 Median Monthly Consumption	[B] Base Rates Plus Revenue Envelope Rates Applied to 2024 Median Monthly Consumption	[C] Base Rates Plus Legacy Charge Rates Applied to 2024 Median Monthly Consumption	[D] Base Rates Plus Revenue Envelope Rates ([B] / [A] - 1) × 100	[E] Base Rates Plus Legacy Charge Rates ([C] / [A] - 1) × 100
(a) Commercial Customer Classes							
GSS 211	750	754	$196.00	$237.36	$227.25	21.10%	15.94%
GSP 212	15,000	15,073	$3,335.76	$4,611.85	$4,353.26	38.25%	30.50%
GST 213	225,000	226,091	$45,995.51	$50,618.93	$49,978.01	10.05%	8.66%
(b) Industrial Customer Classes							
GSS 311	750	742	$193.15	$236.11	$229.34	22.24%	18.73%
GSP 312	15,000	14,848	$3,289.11	$4,673.19	$4,412.80	42.08%	34.16%
GST 313	225,000	222,725	$45,317.45	$51,020.83	$50,346.97	12.59%	11.10%
TOU-T 363	1,000,000	989,890	$214,001.10	$231,211.95	$230,154.51	8.04%	7.55%
LIS 333	8,052,286	7,970,879	$1,606,123.00	$1,728,048.68	$1,723,500.75	7.59%	7.31%
TOU-T 963	446,933	442,415	$89,478.02	$98,476.74	$97,693.03	10.06%	9.18%
(c) Government Customer Classes							
GSS 211	1,001	1,005	$259.79	$308.70	$301.69	18.83%	16.13%
GSP 212	15,000	15,073	$3,335.76	$4,611.85	$4,354.31	38.25%	30.53%
GST 213	250,000	251,213	$51,055.99	$55,930.62	$55,292.75	9.55%	8.30%
(d) Municipality Customer Classes							
GSS 211	501	503	$132.46	$166.30	$156.22	25.55%	-
GSP 212	7,500	7,536	$1,755.00	$2,918.04	$2,663.75	66.27%	-
GST 213	62,500	62,803	$13,091.45	$16,081.98	$15,497.70	22.84%	-
Overall (Average) Percent Difference						26.06%	19.94%

EXHIBIT 14

ELECTRICITY BILL FOR NON-RESIDENTIAL CUSTOMERS: BASE, REVENUE ENVELOPE, AND LEGACY CHARGE RATES

Notes:

[1] Median Monthly Consumption (kWh) is calculated as a median of the monthly medians of electricity consumption. This consumption information was taken from the LUMA data.

[2] The Estimated 2024 Monthly Consumption (kWh) was extrapolated from 2021 to 2024 based on the Board's methodology. The Board extrapolates the 2021 load to 2024 by using the same percent change in the average annual load per customer between the two years. The lighting savings adjusted gross load and the number of customers are taken from the 2022 PREPA Fiscal Plan.

[3] Median Monthly Electricity Bill under Base Rates is calculated by applying the base fixed and volumetric rates from the 2022 PREPA Fiscal Plan to Estimated 2024 Median Monthly Consumption (kWh). The Median Monthly Electricity Bill under Revenue Envelope Rates is calculated by applying the fixed and volumetric rates from the Board's Revenue Envelope to Estimated 2024 Median Monthly Consumption and adding the Median Monthly Electricity Bill under 2022 Fiscal Plan Base Rates. The Median Monthly Electricity Bill under Legacy Charge Rates is calculated by applying the fixed and volumetric rates from the Board's proposed Legacy Charge to Estimated 2024 Median Monthly Consumption and adding it to the Median Monthly Electricity Bill under 2022 Fiscal Plan Base Rates.

[4] The PREPA rate classes are defined as follows: General Service at Secondary Distribution Voltage (GSS) rates apply to any non-residential service with a load lower than 50kVA. They also apply to temporary electric power service for limited use in streets, carnivals, and others. General Service at Primary Distribution Voltage (GSP) rates apply to industrial customers and commercial customers for which service is rendered through a single point of connection and a single meter. General Service at Transmission Voltage (GST) rates apply to commercial and industrial customers connected to the transmission system that have a demand of 250 kVA or greater, for general uses, e.g., motive power, heating, refrigeration, and incidental lighting of industries, hotels, and any other establishment. Time of Use at Transmission Voltage (TOU-T) rates apply to commercial and industrial customers with a demand of 1,000 kVA or greater that (1) transfer load from the on-peak period to the off-peak period; (2) add load during the off-peak period; and (3) remove load from the on-peak period. Large Industrial Service -115 kV (LIS) rates apply exclusively for industries with a demand equal to 12,000 kW or higher, with a load factor equal to 80% or higher, and a monthly average power factor equal to 95% or higher.

[5] Legacy Charge Rates do not include additional charges for the Municipal Customer Class, hence Column E does not have a percentage change value for the Municipal Class.

[6] For rate classes TOU-T 963 and TOU-T 363, the average of the on-peak/off-peak rates provided in the Revenue Envelope and Legacy Charge Derivation Workbook is used in the calculations.

[7] Overall (Average) Percent Difference is calculated as a weighted average of the percent difference for all types of customers, and their proportion of electricity consumption, sourced from LUMA data.

Sources:

[1] Revenue Envelope and Legacy Charge Derivation Workbook.

[2] 2022 PREPA Fiscal Plan

[3] Disclosure Statement.

EXHIBIT 15
ELECTRICITY COSTS RELATIVE TO OPERATING COSTS IN MANUFACTURING INDUSTRY IN PUERTO RICO

	Electricity Cost as Share of Total Operating Costs					
	In 2017	**In 2024**	**Based on the Board's Proposed Maximum Rates**	**Based on the Board's Proposed Legacy Charge Rates**	**Assuming a One Penny Increase to the Board's Proposed Maximum Rates**	**Assuming a 2.5 Cent Increase to the Board's Proposed Maximum Rates**
Electricity Cost as Share of Total Operating Costs	2.47%	2.47%	3.10%	2.95%	3.21%	3.35%
Percentage Change	-	-	26.06%	19.94%	30.53%	36.74%
Calculation	$\frac{\text{Electricity Cost}}{\text{Total Operating Costs}}$		$\frac{\text{Electricity Cost} \times (1 + \text{Percentage Change})}{\text{Total Operating Costs} + \text{Percentage Change} \times \text{Electricity Costs}}$			

Notes:

[1] One Penny and 2.5 Cents Increases correspond to additional charges applied to the additional volumetric charges under the Board's Propsoed Maximum Rates.

[2] The ratio of Electricity Cost to Total Operating Cost is assumed to remain the same in 2024, as it was in 2017.

[3] Operating Costs include cost of materials, components, resales, purchased fuels consumed, purchased electricity, contract work, and other operating expenses, and are obtained from the US Census Bureau "Island Areas: Cost of Materials by Manufacturing Industry for Puerto Rico: 2017."

[4] Percentage Change is calculated in **Exhibit 14.**

[5] Manufacturing includes industries with NAICS codes 31-33.

Sources:

[1] US Census Bureau "Island Areas: Cost of Materials by Manufacturing Industry for Puerto Rico: 2017."

[2] Revenue Envelope and Legacy Charge Workbook.

EXHIBIT 16
ADDITIONAL RATE INCREASES FOR NON-RESIDENTIAL CUSTOMERS
AND IMPACT ON "ADDITIONAL NET REVENUES"

	Volumetric Adder						Incremental "Additional Net Revenues"	
	≤ 500 kWh			> 500 kWh				
	Revenue Envelope Rates	One Penny Increase	2.5 Cent Increase	Revenue Envelope Rates	One Penny Increase	2.5 Cent Increase	One Penny ($ Millions)	2.5 Cent ($ Millions)
(a) Commercial/Government/Municipality Customer Classes								
GSS 211	$0.0150	$0.0250	$0.0400	$0.0300	$0.0400	$0.0550	$128.04	$308.07
GSP 212	$0.0150	$0.0250	$0.0400	$0.0150	$0.0250	$0.0400	$200.02	$454.84
GST 213	$0.0100	$0.0200	$0.0350	$0.0100	$0.0200	$0.0350	$61.47	$124.94
(b) Industrial Customer Classes								
GSS 311	$0.0225	$0.0325	$0.0475	$0.0225	$0.0325	$0.0475	$0.25	$0.58
GSP 312	$0.0225	$0.0325	$0.0475	$0.0225	$0.0325	$0.0475	$7.54	$17.74
GST 313	$0.0150	$0.0250	$0.0400	$0.0150	$0.0250	$0.0400	$58.03	$128.36
TOU-T 363	$0.0150	$0.0250	$0.0400	$0.0150	$0.0250	$0.0400	$10.09	$22.26
LIS 333	$0.0150	$0.0250	$0.0400	$0.0150	$0.0250	$0.0400	$4.68	$10.35
TOU-T 963	$0.0150	$0.0250	$0.0400	$0.0150	$0.0250	$0.0400	$0.59	$1.31
Total Net Revenues							$470.71	$1,068.47

Case:17-04780-LTS Doc#:3441-1 Filed:05/04/23 Entered:05/04/23 13:36:46 Desc:
Exhibit Unredacted Expert Report of Maureen Chakraborty Page 87 of 90

EXHIBIT 16
ADDITIONAL RATE INCREASES FOR NON-RESIDENTIAL CUSTOMERS
AND IMPACT ON "ADDITIONAL NET REVENUES"

Notes:

[1] The One Penny and 2.5 Cent Increases are applied to the Volumetric Adder rates Proposed under the Board's Revenue Envelope.

[2] The additional volumetric charges in the One Penny and 2.5 Cent scenarios increase the Proposed Revenue Envelope volumetric rates by an additional penny and 2.5 cents, respectively, for all non-residential customer classes. I repeat the Board's affordability methodology each year using this income series and projected revenue requirement rates from the 2022 PREPA Fiscal Plan. The remaining calculations to arrive at "Additional Net Revenues" are performed using the same methodology as the Board.

Sources:

[1] Revenue Envelope and Legacy Charge Derivation Workbook.

[2] 2022 PREPA Fiscal Plan.

EXHIBIT 17
"ADDITIONAL NET REVENUES" BASED ON DR. TIERNEY'S REVISED NET LOAD FORECASTS

Scenarios	**"Additional Net Revenues" ($ Billion)**
Board's Proposal: Using 2022 PREPA Fiscal Plan Gross Load	$5.68
Dr. Tierney's Revised Net Load Forecasts	
First Revised Net Load Forecast	$5.75
Second Revised Net Load Forecast	$5.93
Third Revised Net Load Forecast	$6.24

Notes:

[1] The Plan of Adjustment and Disclosure Statement describe a proposal to restructure PREPA's debt principally through an issuance of $5.68 billion of New Bonds to fund partial recoveries on creditors' claims.

Sources:

[1] Revenue Envelope and Legacy Charge Derivation Workbook.
[2] Disclosure Statement.
[3] Tierney Report.

EXHIBIT 18
ELASTICITY ESTIMATES FROM THE ACADEMIC LITERATURE

	Burke, Abayasekara (2018)		Zhu et al. (2018)	
Customer Class	**Short Run**	**Long Run**	**Short Run**	**Long Run**
Residential	−0.10	−1.0	−0.228	−0.577
Commercial	−0.10	[−0.3, −0.6]		
Industrial	−0.10	−1.20		

Sources:

[1] Burke, Paul J. and Ashani Abayasekara,"The Price Elasticity of Electricity Demand in the United States: A Three-Dimensional Analysis," *The Energy Journal* 39, no. 2 (2018): 126−46.

[2] Zhu, Xing, Lanlan Li, Kaile Zhou, Xiaoling Zhang, and Shanlin Yang. "A meta-analysis on the price elasticity and income elasticity of residential electricity demand," *Journal of Cleaner Production* , No. 201, (2018): 169-177.

EXHIBIT 19
"ADDITIONAL NET REVENUES" USING ELASTICITY ESTIMATES FROM ACADEMIC LITERATURE

Scenarios	**"Additional Net Revenues" ($ Billion)**
Board's Proposal: Hypothetical Residential Customer Short Run Elasticity −0.2 and Long Run Elasticity −1.7	$5.68
Elasticity Estimates from Academic Literature	
Burke and Abayasekara (2018) Elasticity Estimates	$5.97
Zhu et al (2018) Elasticity Estimates	$6.26

Notes:

[1] The Plan of Adjustment and Disclosure Statement describe a proposal to restructure PREPA's debt principally through an issuance of $5.68 billion of New Bonds to fund partial recoveries on creditors' claims.

[2] The scenarios vary the short run and long run elasticity of electricity demand used in the Board's calculations. Burke and Abayasekara (2018) find short run elasticity −0.10 for residential, commercial, and industrial customers, and long run elasticity of −1.0 for residential, −0.6 for commercial, and −1.2 for industrial customers. I use these elasticity estimates and, following the Board's methodology, I assume municipal and government customers have the same elasticity as commercial customers. Zhu et al. (2018) find a short run elasticity of −0.228 and a long run of −0.577 for the residential class. In this verison, I use the same adjustment factors as the Board to determine elasticities for other classes. The remaining calculations to arrive at "Additional Net Revenues" are performed using the same methodology as the Board.

Sources:

[1] Revenue Envelope and Legacy Charge Derivation Workbook.

[2] 2022 PREPA Fiscal Plan.

[3] Burke, Paul J. and Ashani Abayasekara,"The Price Elasticity of Electricity Demand in the United States: A Three-Dimensional Analysis," *The Energy Journal* 39, no. 2 (2018): 126−46.

[4] Zhu, Xing, Lanlan Li, Kaile Zhou, Xiaoling Zhang, and Shanlin Yang. "A meta-analysis on the price elasticity and income elasticity of residential electricity demand," *Journal of Cleaner Production* , No. 201, (2018): 169-177.